THE HEATING AND VENTILATING MAGAZINE

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NEW YORK, AUGUST, 1912

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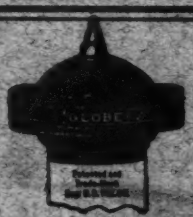

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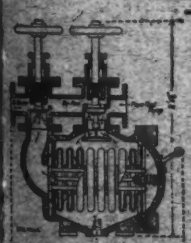

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THE HEATING AND VENTILATING MAGAZINE

1123 BROADWAY NEW YORK AUGUST, 1912

Rotation of Normal Temperatures

BY WILLIAM CAMPBELL.

The question of when to expect the change of seasons has always been more or less of a mystery to the writer until he looked up the United States Weather Bureau's figures on the subject and worked out the analysis given in the accompanying chart and tables.

Although one speaks loosely of June, July and August as the summer months, we all know that the temperature at the first of June and the end of August are not the same. The almanacs give the date and hour of the vernal and autumnal equinoxes and the winter and summer solstices as the dividing points, but these are astronomical phenomena affecting the relative length of day and night, and have no direct relation to the cycle of heat and cold.

The writer, therefore, has plotted the daily normal temperatures for Philadelphia, which represent the average of observations for the last thirty years. (These figures are used as a basis for reporting excess and deficiency of temperature; that is, the daily variations from normal.) Straight lines are drawn connecting dates of the same temperature, and it will be noticed that the corresponding dates are practically an equal number of days distant from a central point, which averages January 23. If it is desired to divide the year into four equal seasons, they begin approximately as follows:

Spring, March 8.
Summer, June 8.
Autumn, September 8.
Winter, December 8.

An abstract is also given herewith of the annual temperature record for a number of cities in this country, the central point, or dead of winter, being different in each case. The dates used are selected so as to give the tables in the briefest and most evenly balanced form. Temperatures for intervening dates can be interpolated with comparative accuracy.

Looking at the Boston table, for instance, July 11 and August 11 are seen to correspond. Such being the case, July 4 and August 8, each of which is one week nearer to the central point (January 26), will also correspond.

Information of this kind has a wide range of application. Especially in the heating field is it valuable as showing what to expect. If a building superintendent in Philadelphia finds by experience that he must start his heating plant October 15, he can count on shutting it down about May 1. If the coal consumption reaches its highest point by December 8, this heavy

demand will probably last until the corresponding date, March 8. There is hardly a factor in heating loads which cannot be foretold accurately by the use of tables of this kind, for the proper city, of course.

ATLANTA.

July 29 and June 29	77
Aug. 29 and May 29	74
Sept. 29 and April 29	67
Oct. 29 and March 29	57
Nov. 29 and Feb. 29	48
Dec. 29 and Jan. 29	43
Jan. 14	42

DENVER.

Aug. 6 and July 6	72
Sept. 6 and June 6	65
Oct. 6 and May 6	55
Nov. 6 and April 6	44
Dec. 6 and March 6	35
Jan. 6 and Feb. 6	30
Jan. 21	29

PHILADELPHIA.

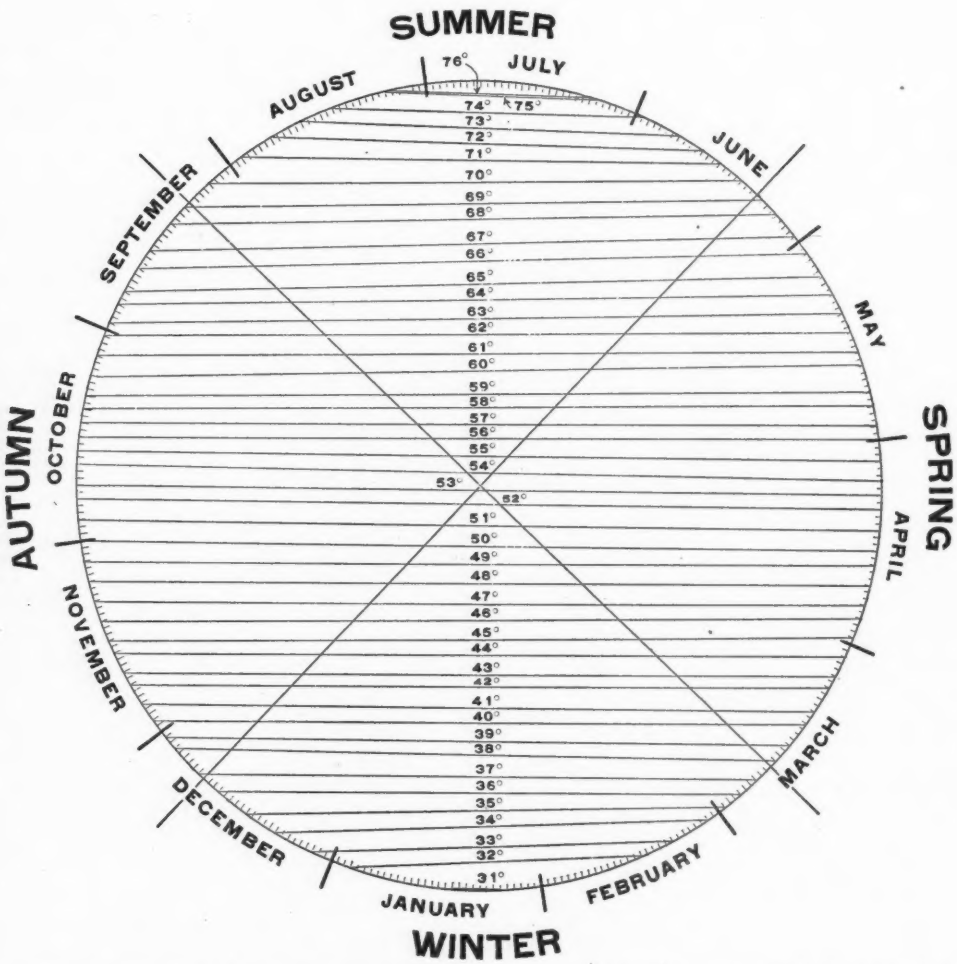
Aug. 8 and July 8	75
Sept. 8 and June 8	69
Octfl 8 and May 8	60
Nov. 8 and April 8	48
Dec. 8 and March 8	37
Jan. 8 and Feb. 8	32
Jan. 23	31
Jan. 23	31

SEATTLE.

Aug. 6 and July 6	64
Sept. 6 and June 6	59
Oct. 6 and May 6	55
Nov. 6 and April 6	47
Dec. 6 and March 6	42
Jan. 6 and Feb. 6	40
Jan. 21	39

CHICAGO.

Aug. 10 and July 10	72
Sept. 10 and June 10	66
Oct. 10 and May 10	55
Nov. 10 and April 10	43



DIVISION OF SEASONS IN PHILADELPHIA, ACCORDING TO TEMPERATURE RECORDS BASED UPON THIRTY YEARS' OBSERVATIONS.

Dec. 10 and March 10	32
Jan. 10 and Feb. 10	24
Jan. 25	23

NEW ORLEANS.

Aug. 4 and July 4	81
Sept. 4 and June 4	79
Oct. 4 and May 4	73
Nov. 4 and April 4	65
Dec. 4 and March 4	58
Jan. 4 and Feb. 4	54
Jan. 19	53

BOSTON.

Aug. 11 and July 11	71
Sept. 11 and June 11	64
Oct. 11 and May 11	55
Nov. 11 and April 11	43
Dec. 11 and March 11	33
Jan. 11 and Feb. 11	27
Jan. 26	26

NEW YORK CITY.

Aug. 9 and July 9	73
Sept. 9 and June 9	68
Oct. 9 and May 9	58
Nov. 9 and April 9	46
Dec. 9 and March 9	35
Jan. 9 and Feb. 9	30
Jan. 24	30

PITTSBURG.

Aug. 9 and July 9	74
Sept. 9 and June 9	69
Oct. 9 and May 9	59
Nov. 9 and April 9	47
Dec. 9 and Marcsh 9	37
Jan. 9 and Feb. 9	31
Jan. 24	30

WASHINGTON, D. C.

Aug. 4 and July 4	76
Sept. 4 and June 4	71
Oct. 4 and May 4	61
Nov. 4 and April 4	49
Dec. 4 and March 4	38
Jan. 4 and Feb. 4	33
Jan. 19	32

ST. LOUIS.

Aug. 5 and July 5	78
Sept. 5 and June 5	73
Oct. 5 and May 5	63
Nov. 5 and April 5	50
Dec. 5 and March 5	38
Jan. 5 and Feb. 5	32
Jan. 20	30

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*Heating and Ventilation of a Mitten Factory**

RESULTS OBTAINED IN A PLANT WHERE DIRECT RADIATION WAS PURPOSELY OMITTED.

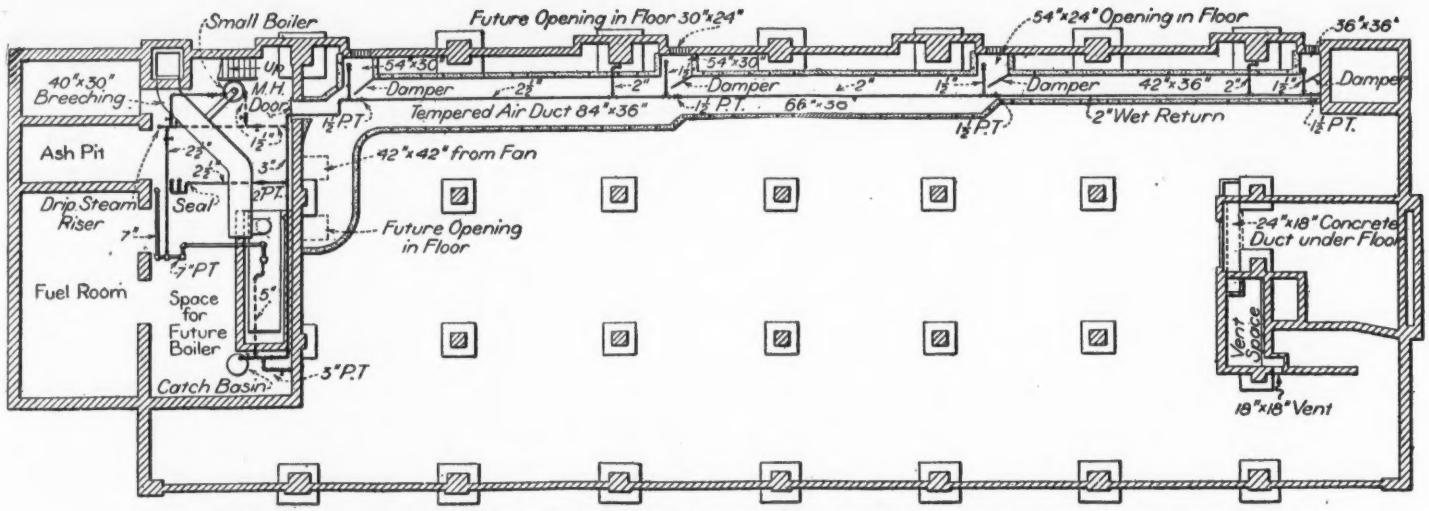
By Samuel R. Lewis.

The object of this paper is to describe the heating and ventilating arrangements of the factory of the Defiance Tick Mitten Company, Toledo, O. The first floor is used for storage, packing, etc., while the second floor is occupied by about 250 operatives, nearly all women, who work at power sewing machines, pressing and finishing tables, etc. There are a number of steam-heated forms upon which the finished gloves and mittens are pressed.

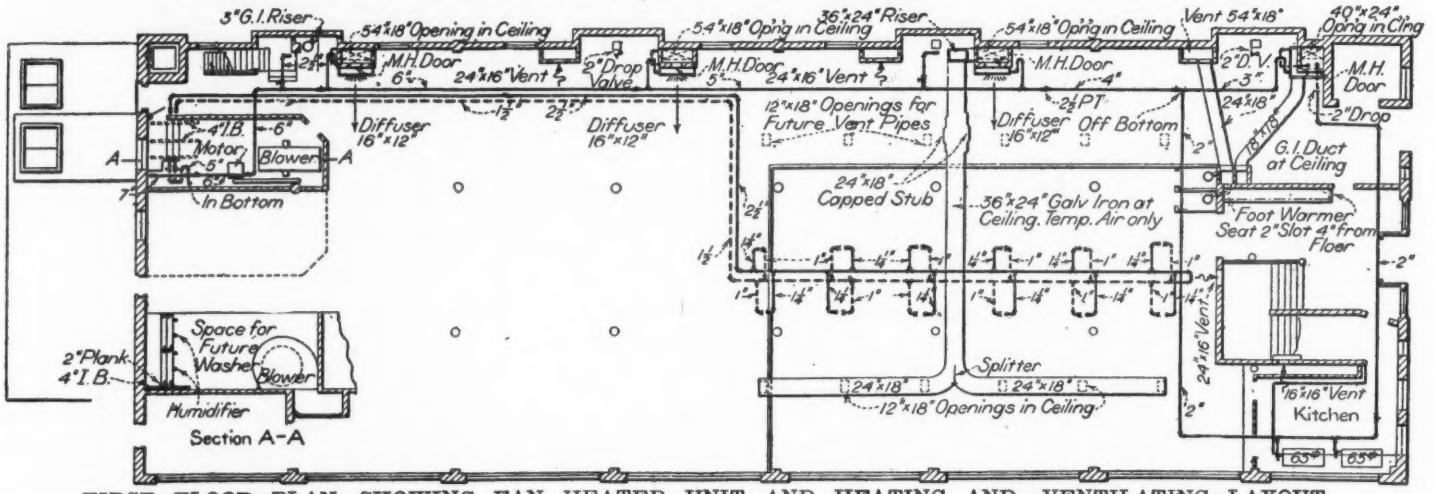
The desire of the owner was to provide an especially sanitary, light and attractive building, as he had learned by experience that these features had so great an influence on the attendance and efficiency of labor that it was a good business investment as well as a function of good citizenship to provide them. The operatives are nearly all paid by piecework, and are found to be quite independent as to their attendance. By providing pleasant and healthful surroundings for the girls and women, with such equipment as individual steel lockers, a warm lunch, shower baths, rest rooms, etc., the tendency is to maintain a full force when labor is scarce, at the expense of competitors who have less attractive shops.

The building is of reinforced concrete construction, with brick curtain walls and a saw-tooth roof. The windows are all in steel sash. The roof is of composition, laid on matched plank, and supported on steel trusses. The building is intended as the first of a group of a similar type, sur-

*Read at the semi-annual meeting of the American Society of Heating and Ventilating Engineers, Detroit, Mich., July11-12, 1912.

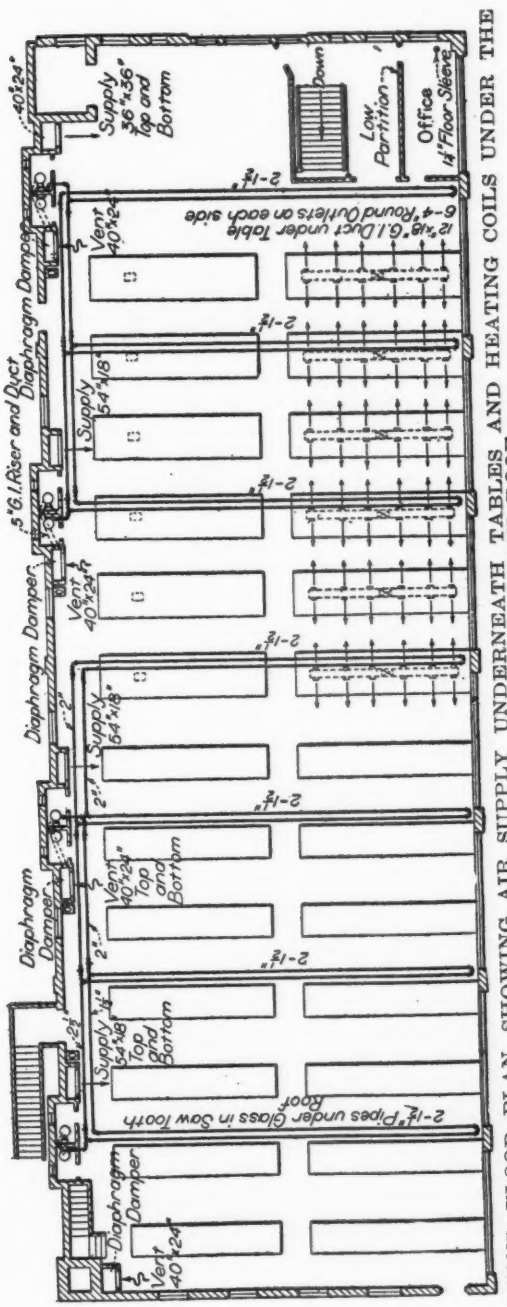


BASEMENT PLAN, SHOWING TEMPERED AIR DUCT SUPPLIED BY FAN ON FIRST FLOOR.

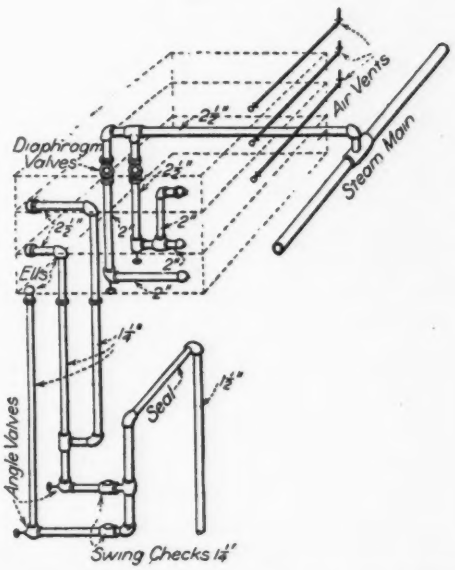


FIRST FLOOR PLAN, SHOWING FAN HEATER UNIT AND HEATING AND VENTILATING LAYOUT.

rounding a central administration building and power plant. It is one-half of a future unit, and the division of the apparatus is such that the



SECOND FLOOR PLAN, SHOWING AIR SUPPLY UNDERNEATH TABLES AND HEATING COILS UNDER THE SECTIONS OF THE SAWTOOTH ROOF.



TYPICAL CONNECTIONS TO HEATING COILS.

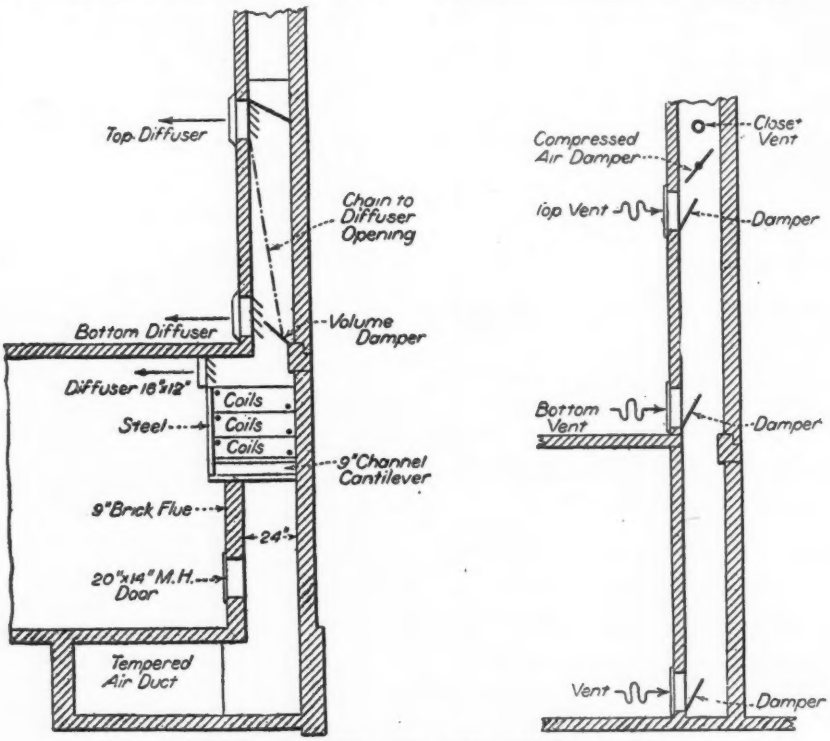
boiler, fan, coils, etc., for the other half may be added later on. Thus, the cost of the present plant was very little in excess of what it would have been had there been no thought of future additions. The boilers are placed in a sub-basement; one has capacity for all heating, ventilating and manufacturing requirements, and the other is provided for summer use for manufacturing and water heating. The principal manufacturing demand for steam is for heating the metallic forms used in pressing the finished product.

AIR SUPPLY.

Fresh air is supplied through special steel casement sash, and is drawn through tempering coils and steam jet humidifiers to the supply fan. The steam supply to the tempering coils is controlled by a thermostat so that the tempered air is never cooler than about 60° F, or warmer than that, unless the outside temperature is higher than 60°. The steam jets are controlled by a sensitive element which operates within a range of less than 5% of the point at which it is set (about 40% relative humidity). The supply fan delivers this conditioned fresh air through a concrete duct (which also serves as a return pipe trench) to the bases of the various flues. These flues have, near the ceiling of the first floor, individual heating coils, which have automatical-

ly controlled steam supply valves. The thermostats which operate these valves are of the gradual or stage operating type, and reduce or increase the amount of heated radiating surface as the temperature requirements dictate.

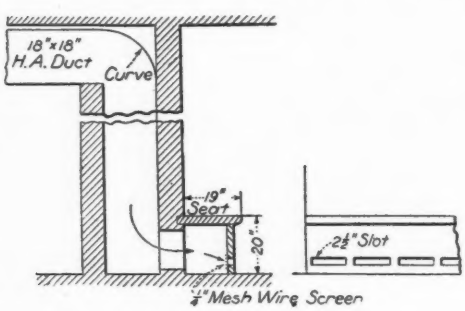
The various supply flues discharge some air into the first floor, but their principal function is to serve the second floor, where a minimum of 30 cu. ft. of fresh air per occupant per minute is provided. When the building is being heated the fresh warm air is discharged at a point about 10 ft. from the floor through adjustable diffusers. It passes across the skylights and is forced against the almost continuous glass surface of the opposite wall. When the building is warm, however, the fresh air is discharged at the floor line through adjustable diffusers, directly at the lines of operatives. When heating, the exhaust air leaves the room at the floor, but when cooling or merely ventilating the exhaust air leaves the room at the ceiling. To this end, each supply flue and each vent flue has two openings, with adjustable dampers in each.



TYPICAL FRESH AIR AND VENT FLUES.

In order that the operatives at the steam-heated forms may have the maximum of comfort, a 4-in. tempered air inlet at the floor, with an adjustable universal elbow and a blast gate for regulating the volume to each person, is provided. To offset possible cold drafts from the exposed roof or skylights, pipe coils under separate hand control are placed under each saw-tooth glass area.

Many of the operatives walk some distance, and are liable to arrive at work with wet skirt bottoms and damp feet and ankles. A floor inlet would



AIR WARMING SEAT IN HALL.

be objectionable on sanitary reasons, and so the concrete bench for drying purposes is provided and has proved quite effective. The seat is warm, about 100°, and through slots in its face a little above the floor a strong blast of air at about 120° maximum is delivered parallel with the floor. This air also warms the entrance hall and stairway.

The escape of air from the building when it is unoccupied may be cut off by special dampers in the outlet flues, all being operated by compressed air by one switch valve in the fan room. All toilet fixtures are individually ventilated through local vent openings in the bowls to separate vent flues.

There is no direct radiation. The plant has been in operation through the severe weather of the past winter and has proved entirely adequate. There have been no objectionable drafts, though many operatives sit at work directly alongside the exposed glass surface opposite the supply inlets. It has been found so far that the coils in the skylights are unnecessary.

The ventilation has been excellent. It has been found economical to keep the outlets closed and to rotate the air within the building, taking in no outside air when heating prior to occupancy. There has been increased comfort and no objectionable odor when the humidifying apparatus was in use, and when the temperature was kept down to 65°. There was no serious complaint of overheating with the temperature at 70° and the humidity at 40%, relative.

The absence of direct radiators contributes greatly to the ease of cleaning and to the comfort and fuel consumption. With this system, the loss of heat through the glass and wall surface, for instance, is less, since the inside temperature is close to 70° all over, while with direct radiators it would be close to 212° opposite every unit.

Langdon & Hohly, of Toledo, O., were the architects of the building.

Office Practice in Estimating Heating and Ventilation

By John D. Small.

A set of twelve questions relating to office practice in estimating heating and ventilating work, accompanied by a summary of seven answers received, constituted an interesting paper presented by Mr. John D. Small at the recent summer meeting of the heating engineers' society.

The questions and a summary of the answers are as follows:

1. WHAT RULE DO YOU USE FOR ESTIMATING RADIATION?

The majority of expressions on this question favored a formula based on the number of heat units loss through various cooling surfaces and materials and the number of heat units required to compensate for air change due to leakage and exposure. Coefficient table for this purpose are found in a number of handbooks and the losses due to air change represent what the engineer's judgment dictates, except where fixed by law. Carpenter's and Mill's rules are largely used also.

2. HOW MANY AIR CHANGES PER HOUR DO YOU ALLOW IN THE FOLLOWING CLASSES OF BUILDINGS?

Residences.
Hotels.
Hospitals.
Office Buildings.
Store Buildings.
Theaters.
Factories (except where exhausters are used).

This factor seems to be a very indefinite one where the amount of air displaced is not fixed by law or otherwise. In buildings where no mechanical ventilation is provided, the rate of air change would be effected by a number of causes, one of the principal causes being natural leakage, which varies with the kind of construction, the exposure, the wind velocity and the height of the building.

Under the head of construction, the kind of window frames used has a great deal to do with the rate of in-

filtration of air. The sides of the building exposed to prevailing winds will, of course, show a marked increase in air displacement over the protected sides. Air currents, however, between high buildings, due to deflection from one to the other, will often affect the surface which otherwise would be protected.

Tests made by Mr. H. W. Whitten have demonstrated that with wind velocities below 6 miles per hour infiltration is reduced to a minimum; while with velocities as high as 30 miles per hour a very substantial effect is produced upon the rate of air change of the interior of the exposed portion of the building. Again, the leakage is relatively greater as the building increases in height due to increased wind pressure at increasing heights. From the foregoing observations it is important to use considerable judgment in arriving at the maximum allowance to compensate for losses due to this element, and in the absence of a fixed rule, the following schedule, in the author's opinion, would be a safe basis for calculating the amount of heat required under maximum conditions of air change in addition to that required to offset losses through the cooling surfaces. Allow air changes per hour for various rooms and classes of buildings as given in the table:

TABLE OF NUMBER OF AIR CHANGES TO BE USED IN HEATING CALCULATIONS.

Office Buildings—Portions above grade—1 air change per hour.

Basement, general—4 air changes per hour.

Mechanical plant—10 air changes per hour.

Factory Buildings, which have no mechanical or natural ventilation, one change per hour. For factories where large doors from the outside are frequently opened, about four air changes per hour.

Residences—having loose windows, two changes per hour.

Churches—Four changes per hour except small rooms, which should have five to six changes per hour. These data for churches contemplate mechanical ventilation.

The majority of public buildings and many of the factories require ventilation or the fan system of heating. The usual specifications of air supplies per person are as follows:

Hospital, ordinary—35 to 40 cu. ft. per min. Hospitals, epidemic—80 cu. ft. per min.

Hospitals—Tuberculosis—

	AIR CHANGE
Dejection Room	6 Min.
Toilet Rooms	6 "
Bath and Duty Rooms	8 "
Kitchen	3 "
Serving	10 "
Fumigating	10 "

Workshops—25 cu. ft. per min.

Prisons—30 cu. ft. per min.

Theaters—20 to 30 cu. ft. per min.

Meeting Halls—20 cu. ft. per min.

Schools—30 cu. ft. per min. per child and 40 cu. ft. per min. per adult.

Hotels—Following air changes are usual:

ROOM	AIR CHANGE
Engine	6 Min.
Kitchen	1½ "
Restaurant	6 "
Base Toilet	5 "
Billiard	10 "
Barber Shop	8 "
Dining Room	15 "
Palm Room	12 "
Buffet	8 "
Cafe	8 "
Lobby under balcony	8 "
Main Lobby	20 "
Banquet Hall	15 "
Retiring Room	10 "
Kitchens	8 "
All others	15 "
Except Toilets	6 "

Libraries:—

ROOM	AIR CHANGE
Corridors	15 Min.
Basement Rooms	15 "
Reading Rooms	12 "
Inside Rooms	8 "
Corner Rooms	7 "
Toilet Rooms	5 "

Laundries—should have an air change every 4 to 6 min. Radiation on sides of buildings subjected to prevailing and cold winds should be increased 10 per cent. up to the 10th floor and 15 per cent. above.

3. IN YOUR OPINION IS IT MORE PRACTICAL TO HEAT AND VENTILATE WITH HOT AIR ONLY OR TO VENTILATE WITH TEMPERED AIR AND PROVIDE DIRECT RADIATION FOR HEAT LOSSES THROUGH COOLING SURFACES?

While a difference of opinion prevails on this subject, it seems to be desirable to provide direct radiation for use when fans are shut down. The argument is advanced that omission of direct radiation makes it impossible to heat without ventilating, as the fan must be run in order to heat. Direct radiation in addition to the fan system, one to offset the cooling effect of walls and glass and the other for ventilation only, makes a flexible system and admits of uniform regulation of temperature for various exposures perhaps better than the fan system only.

It is also true that the relation of supply and exhaust opening in a given room sometimes results in short circuiting and defeats thorough ventilation as well as requiring direct radiation to care for portions not warmed on this account. Therefore, it would appear that where possible it would not only be more practical but more satisfactory results could be guaranteed if direct combined with the blast system is installed.

4. DO YOU CONSIDER IT GOOD PRACTICE TO INSTALL RADIATION IN FACTORIES ONLY SUFFICIENT FOR NORMAL WINTER TEMPERATURES AND INCREASE PRESSURE TO COMPENSATE FOR DEFICIENCY WHEN MAXIMUM WINTER TEMPERATURES PREVAIL?

The concensus of opinion is decidedly against installing radiation in factories only sufficient for normal winter temperatures and increasing steam pressure to compensate for deficiency when maximum winter temperatures prevail, especially where exhaust steam is used for heating as the engines would be subject to back pressure and general efficiency reduced. The money saved on first cost of the heating system would be spent in operation later, thus resulting in poor economy on the long run. It would, therefore, appear that this method would not be considered good practice, although owners are often influenced to cut down the first cost in this way, not fully realizing the net result.

5. DO YOU ADVOCATE USING MAINS AS HEATING SURFACE OR COVERING THEM THROUGHOUT?

The conditions and class of buildings govern largely whether the mains should be used as heating surface or should be covered. Under the head conditions, would be considered the cost of covering, the location of mains and the length of run together with the length of risers in connection with the mains. For low buildings and not excessively long runs, the mains are very often left uncovered, and without bad effects. In high buildings and in central heating systems, however, it is essential to cover mains in order to diminish the steam pressure and therefore temperature to a minimum extent at the terminals. There have been cases where the steam chilled or condensed to such an extent due to surrounding temperature that it became necessary to cover the mains. The consensus of opinion is to cover the mains, as a rule, for best results in heat distribution.

6. TO WHAT EXTENT DO YOU ADVOCATE THE USE OF VACUUM DEVICES IN HEATING SYSTEMS?

The use of vacuum devices in heating systems is looked on with favor in the majority of cases, especially where exhaust steam is used for the following reasons: It aids circulation of the steam; tends to remove back pressure; allowse small piping to be used, thus reducing cost for long runs; eliminates air valves with the attendant annoyance occasioned by adjustment, leakage, etc.

However, there are many instances where vacuum systems are of no

particular advantage. On the other hand, there are cases where it is absolutely necessary to install such a system to accomplish circulation of the steam and the return of consuch an extent that instead of circulating steam at or below atmospheric densation. On the whole, installations would be benefited by the use of vacuum devices. In this connection it has been the author's observation that pipe sizes have been reduced to pressure it was really necessary to carry from 2 to 8 lbs. steam pressure to overcome the resistance in supply piping, a condition which defeats one object of a vacuum system. With a differential existing at each unit it is important to eliminate undue resistance to the flow of steam to obviate carrying excessive vacuum to balance this resistance.

7. IN YOUR OPINION, IS IT FEASIBLE TO STANDARDIZE METHODS OF ESTIMATING HEATING AND VENTILATING IN DIFFERENT CLASSES OF BUILDING WHERE THERE IS NO LAW GOVERNING THE INSTALLATIONS?

This is a delicate question and does not permit of definite answer. The judgment of the engineer is a large factor in this connection. The author's thought in putting this question was to ascertain if, for instance, this society could consistently go on record as favoring the adoption of the method of estimating direct radiation on the heat unit basis and establish given values for various conditions and classifications and construction materials.

8. IN LARGE OPEN ROOMS, SUCH AS IN STORES, FACTORIES, ETC., WOULD YOU FIGURE THE RADIATION THE SAME ON ALL SIDES AND THEN PLACE A LARGER PROPORTION ON THE MOST EXPOSED OR WINDWARD SIDE? IF SO, WHAT PROPORTION? OR WOULD YOU FIGURE IT THE SAME ON ALL SIDES AND ADD RADIATION ON THE MOST EXPOSED SIDES? IF SO, HOW MUCH?

The majority favor figuring the radiation on the same basis for all exposures and placing a larger proportion on the most exposed or windward sides, it being the idea that the heat will equalize, due to wind pressure, and eventually find its way to the opposite side of the building, whereas, if the same proportion were placed all around, the temperature on the windward side would be too low, and on the opposite side too high. To figure the radiation the same all around and then add to that on the most exposed or windward side would require more radiation than otherwise, and would not be so effective and economical as the first method.

9. IN FIGURING ON THE BASIS OF THE HEAT LOSS THROUGH VARIOUS COOLING SURFACES, WHAT AUTHORITY DO YOU USE FOR THESE COEFFICIENTS?

Carpenter, Wolff, Péclet, Box, values deduced from the German authorities by Kinealy and various handbooks which quote values deduced by recognized authorities are referred to for those data. These tables are very helpful in figuring the heat losses through various building materials and combinations of materials which compose the walls and roof of a structure.

10. IN ESTIMATING RADIATION, DO YOU CONSIDER THE TYPE OF WINDOW CONSTRUCTION, WHETHER LOOSE FITTING OR PROVIDED WITH PATENTED WEATHER STRIPS?

11. IF WINDOWS ARE PROVIDED WITH WEATHER STRIPS, WOULD YOU REDUCE THE AMOUNT OF RADIATION? IF SO, HOW MUCH?

Ordinarily it is assumed that the sash and frames are of wood, and not provided with weather strips. If concealed weather strips are used the radiation may safely be reduced from 10% to 15%. While if metal sash and frames are used the radiation should be increased.

12. IN YOUR OPINION, IS IT FEASIBLE TO HEAT A FACTORY BUILDING COMPRISED OF TWO OR MORE TYPICAL FLOORS BY RUNNING PIPE COILS AROUND THE OUTSIDE WALLS, ANY GIVEN NUMBER OF PIPES HIGH, REGARDLESS OF THE CONTENTS OR FLOOR AREA?

Given a factory building, exposed on four sides and two or more typical floors, it has been held that to install pipe coils around the walls to care for cooling surfaces is sufficient to maintain proper temperature without taking into consideration cubical contents. This seems to work successfully in some cases, and in others it is found that radiation is insufficient. There is a certain percentage of a room of large dimensions which may be neglected with regard to air change, but just what proportion is yet to be satisfactorily answered. The author would like to obtain a discussion on this point particularly and wishes to thank the members who responded in the interests of the foregoing.

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*Temperature Equivalents of Wind Velocities**

By H. W. Whitten.

In January, 1911, the author reported to the society the result of observations at the group of buildings of the Harvard Medical School. The total heat expended and average temperatures and average wind velocities were recorded daily during the months of January and March, 1910.

A comparison of these records showed that 1 mile of wind movement per hour required substantially the same amount of heat supply as 1° change in temperature. A further study of similar records, however, has shown that 1 mile movement of wind per hour does ont bear a constant equivalent to 1° drop in temperature. There appears to be a greater proportion of loss due to wind movement as the temperature drops.

This led the author to make investigations as to the impact effect of wind of the same velocity at different temperatures. He found that there is a regular rate of increase in effective pressure as the temperature drops, although the wind velocity remains constant. This regular rate of increase of pressure is maintained only while the barometer readings are normal. A barometrical change caused changes in the impact pressure. The author was unable to determine the exact rate of this change, but was able to detect the fact of such change, the tendency being for an increase in pressure as the barometer rose and for a decrease as it fell.

He estimated, however, that, with the barometer and the wind constant, the increase in pressure is 0.4% per degree drop in temperature. He also found that the non-pressure or suction on leeward sides of buildings increased in about the same proportion. The point at which heat loss from 1 mile of wind movement per hour and temperature were equal seemed to be between 36° and 39° F. above zero. Above this temperature, the effect of wind became less important than the temperature changes, and below it, correspondingly more important.

For example: If, at 37° F., 1 mile of wind movement per hour is equal to 1° drop in temperature, at zero, 1 mile of wind movement per hour will equal 1° plus 37×0.004 or 1.148° F. If the temperature increases to 50°, then 1 mile of wind movement equals $1 - 13 \times 0.004 = 0.948°$ F.

TESTS OF WIND PRESSURE AT VARYING TEMPERATURES.

Mr. Albert F. Zahm, secretary of the Aero Club of America, has made exhaustive experiments on the subject of wind pressure at varying temperatures. He states that, with velocity meters placed in the same vicinity, different readings are found to occur simultaneously in the several instruments. If, however, each air-meter is read in conjunction with a pressure meter the results become more intelligible. He further states that a change in temperature of 3°, or a barometer change of 8 millimeters, will alter the pressure 1% with the

*Presented at the mid-summer meeting of the American Society of Heating and Ventilating Engineers, at Detroit, Mich., July 11-12, 1912.

wind constant. He found that variations were also caused by the moisture content of the air, but that this element was so slight as to be negligible. Moisture is never over 5% of the mass of the air and rarely over 2½%. The difference in weight between air and water vapor being small, this factor does not appreciably change the result.

RULE FOR OBTAINING CORRESPONDING TEMPERATURE WITH VARYING WIND VELOCITIES.

The author has adopted as a rule for personal guidance the following: From 40° to 15° F., 1 mile of wind movement per hour is equal to 1° drop in temperature; from 15° to — 20°, 1 mile of wind movement per hour is equal to 1.15° drop in temperature. This is for buildings constructed in the ordinary manner, that is, without protected windows. Applied strictly to the glass surface, the loss from wind movement may be calculated as only 3/7 of the loss under usual and ordinary conditions. This not only applies to the sides having the so-called greatest exposure, but, owing to the suction or non-pressure existing on the sheltered sides, should be applied to all sides of the building.

Chicago's Civil Service Examination for Ventilating Inspector in Charge.

Some of the principal questions and problems submitted in connection with the examination for ventilating inspector in charge in Chicago are given herewith. Other subjects connected with the examination related to experience and penmanship and to simple problems in arithmetic:

1. What are the principles upon which you would base the design and location of inlets and outlets in a system of mechanical ventilation for a school room of dimensions suitable for prolonged occupancy by fifty persons and in which there is one outside wall?

2. (a) Discuss humidity in its relation to (1) its hygienic aspects; (2) its relation to varying temperatures. (b) State the laws covering convection currents and discuss their various applications to ventilation.

3. (a) Give your ideas as to the proper organization for a bureau of ventilation for the City of Chicago. (b) What methods of administrative control should be applied to the ventilation of (1) new buildings; (2) existing buildings?

4. (a) State the provisions of the ordinance covering ventilation of workshops or places of employment. (b) State the ventilation provisions applicable to existing auditoriums, classrooms and assembly halls. (c) What are the air space and ventilation requirements in new hospital buildings?

5. Give a brief resumé of the experimental work which has been done in an effort to discover the harmful effects in or associated with expired air.

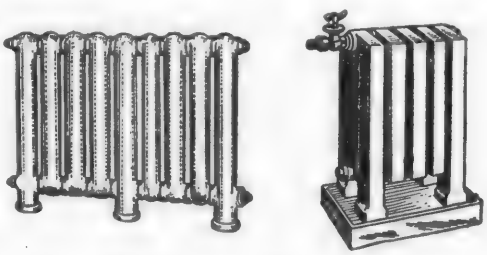
1. Discuss the practical methods of street car ventilation.

2. The prints handed you consist of a plan, longitudinal and cross sections, of a small theatre having a seating capacity of 300 persons.

Design on these plans in colored pencil a system of ventilation which will supply 1,500 cu. ft. of air per hour per person, generally distributed in the room between the limits of 2½ ft. and 8 ft. above the floor. State in full the types and sizes of fans and ducts employed, the velocities of flow intended for the different parts of the system, the speed of the fan and any other essential factors of the design. Give the computations in full.

German Concrete Radiators.

An item in THE HEATING AND VENTILATING MAGAZINE for July stated that concrete radiators were being experimented upon in Germany with apparent success. This new type of heating apparatus is shown in *Popular Mechanics.* with the comment that the radiators are formed by pouring a mixture of cement



TWO FORMS OF CONCRETE RADIATORS MADE IN GERMANY.

and sand into special gypsum molds, or iron castings, and can be made in all colors and shapes. The thickness of the walls is about ⅜ inch.

"The most important feature of these radiators," says the writer, "has to do very intimately with hygiene. Being porous, they furnish moisture as well as heat to the air in a room." The low cost of construction is also emphasized.

At recent hygienic exhibitions in Germany, it is stated, concrete radiators were shown in many forms and colors.

Regulating the Flow and Return Temperatures in a Large Hot Water Heating System

A SCHEDULE WHICH TAKES INTO ACCOUNT WIND AS WELL AS OUTDOOR TEMPERATURES.

By G. E. Chapman.

A unique method of operating a large central station hot-water heating plant was described in connection with a paper read at the recent convention of the National District Heating Association by G. E. Chapman, district superintendent of the Public Service Corporation of Northern Illinois. Mr. Chapman also told of a novel type of home-made anemometer he had devised, which is illustrated herewith.

The company's plant is located in Oak Park, Ill., and includes, in a general way, combined mechanical and electrical equipment which is operated in conjunction with the heating system. A total of 710 houses, containing 550,000 sq. ft. of radiation, are heated from this plant.

The building is a one-story structure with a basement, and is built of red brick and reinforced concrete, having floor space of approximately 22,000 sq. ft. The large stack, indicated on the accompanying drawing, is made of reinforced concrete and is lined with fire brick, the height being approximately 200 ft. from the sidewalk level to the top.

The property at the east of the plant is used for the storage of coal and has a capacity to store 10,000 tons. Our coal is shipped in over the Chicago & Northwestern Railroad tracks and is delivered to our yards by means of an elevated switch track direct from the main line of the railroad. The coal is dumped from the cars directly below the track, as long as there is room for it. After this space is filled the cars are unloaded by means of a large Gantry crane, which was built and installed by the Northern Engineering Company of Detroit. This crane not only unloads the coal from the cars, but is also used for conveying the necessary supply to the bunkers daily.

Our boiler plant consists of fourteen Sterling boilers, ten of which have a rated capacity of 300 H. P. and four are rated at 450 H. P. each, all being fired by means of Green Engineering Company automatic stokers.

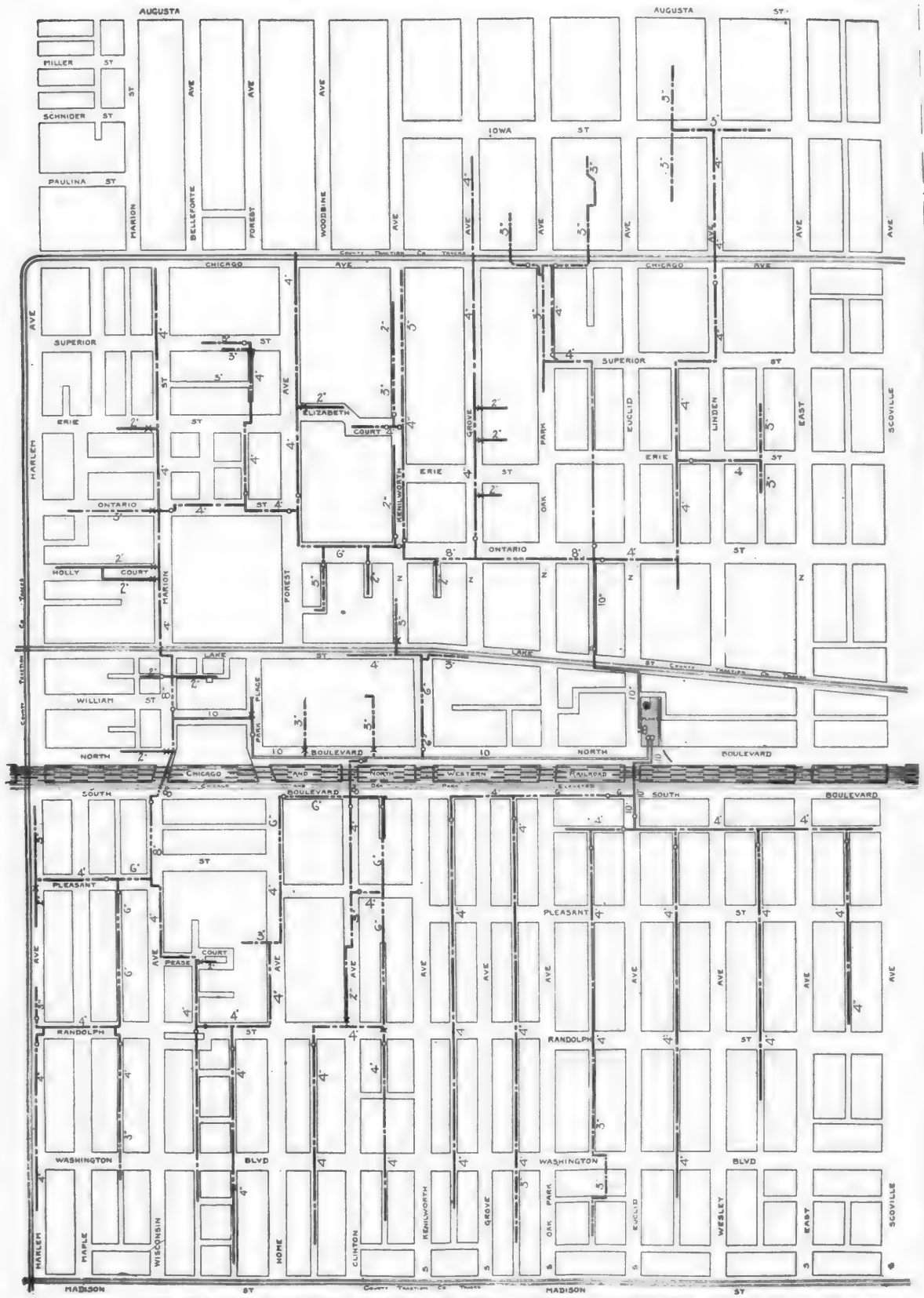
The removal of the ashes from beneath the furnaces is accomplished by means of a steel pneumatic suction system, which has a capacity to handle 350 lbs. of ashes per minute, depositing them in the large steel closed hopper located on the outside of the plant. The bottom of this hopper is sufficiently high to allow a large cinder wagon to be driven underneath, and the driver, by means of operating a sliding gate, can dump the ashes into the wagon without further handling.

The four boilers at the extreme south end of the plant are used exclusively for heating the water for the heating system, and the ten remaining boilers are used for generating high pressure steam in connection with the operation of the steam-driven pumps, as well as the electrical machinery.

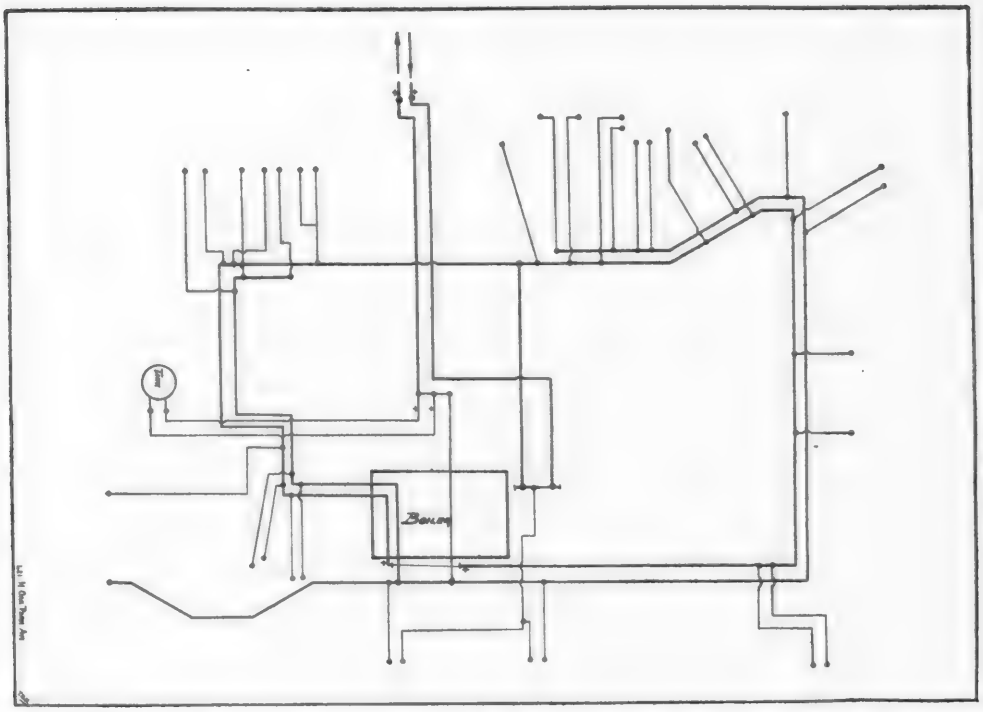
In connection with the battery of heating boilers, we have a Green economizer, having a capacity of 7,200 sq. ft. of heating surface, each of the heating boilers having 3,000 sq. ft. of heating surface.

PUMPING SYSTEM.

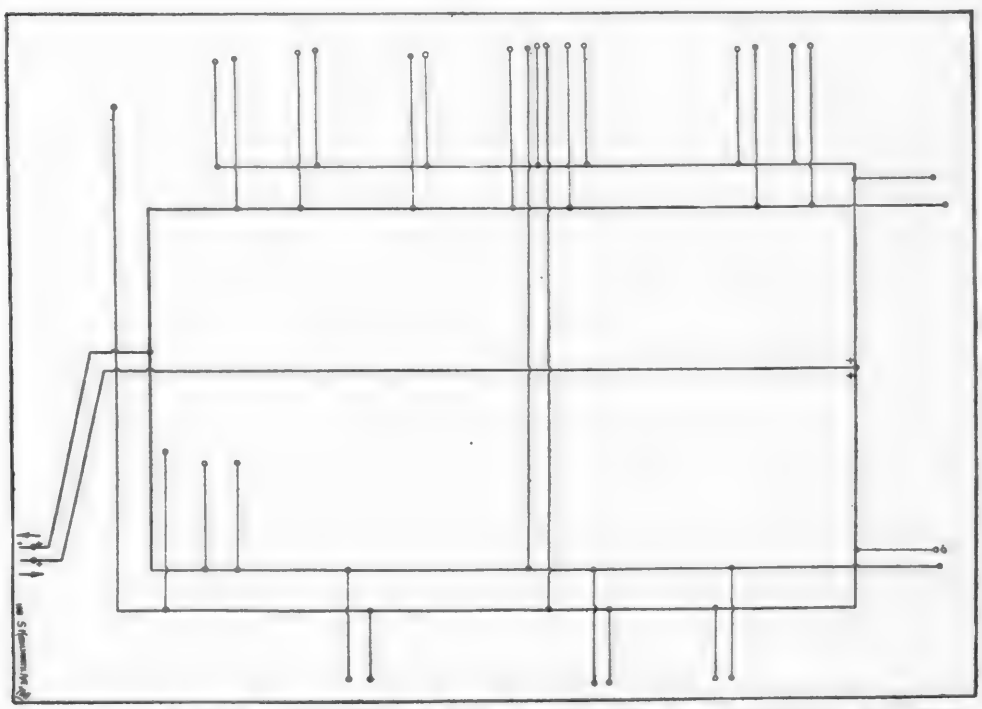
We have four centrifugal steam turbine-driven pumps for the purpose of circulating the water in the heating system. One of these pumps is what is known as Delaval, having a capacity to circulate 2,250 gals. of hot water per minute; the other three are known as Terry steam pumps, having a capacity to circulate 2,500 gals. of hot water per minute each, all of which are directly connected to the closed underground heating system. In connection with the above mentioned pumping system, we have in operation one Duplex balanced column make-up pump, which works automatically, and is governed by the pressure of the



HOT WATER HEATING MAINS OF THE PUBLIC SERVICE COMPANY OF NORTHERN ILLINOIS AT OAK PARK, ILL.



TYPICAL PIPING CONNECTIONS FOR RESIDENCE, OAK PARK, ILL.



STANDARD PIPING CONNECTIONS FOR RESIDENCE AS ADOPTED BY THE PUBLIC SERVICE COMPANY OF NORTHERN ILLINOIS.

water on the main return pipe. This pump is for the purpose of making up for any water which may be lost, due to leaks in the underground heating system.

UNDERGROUND SYSTEM.

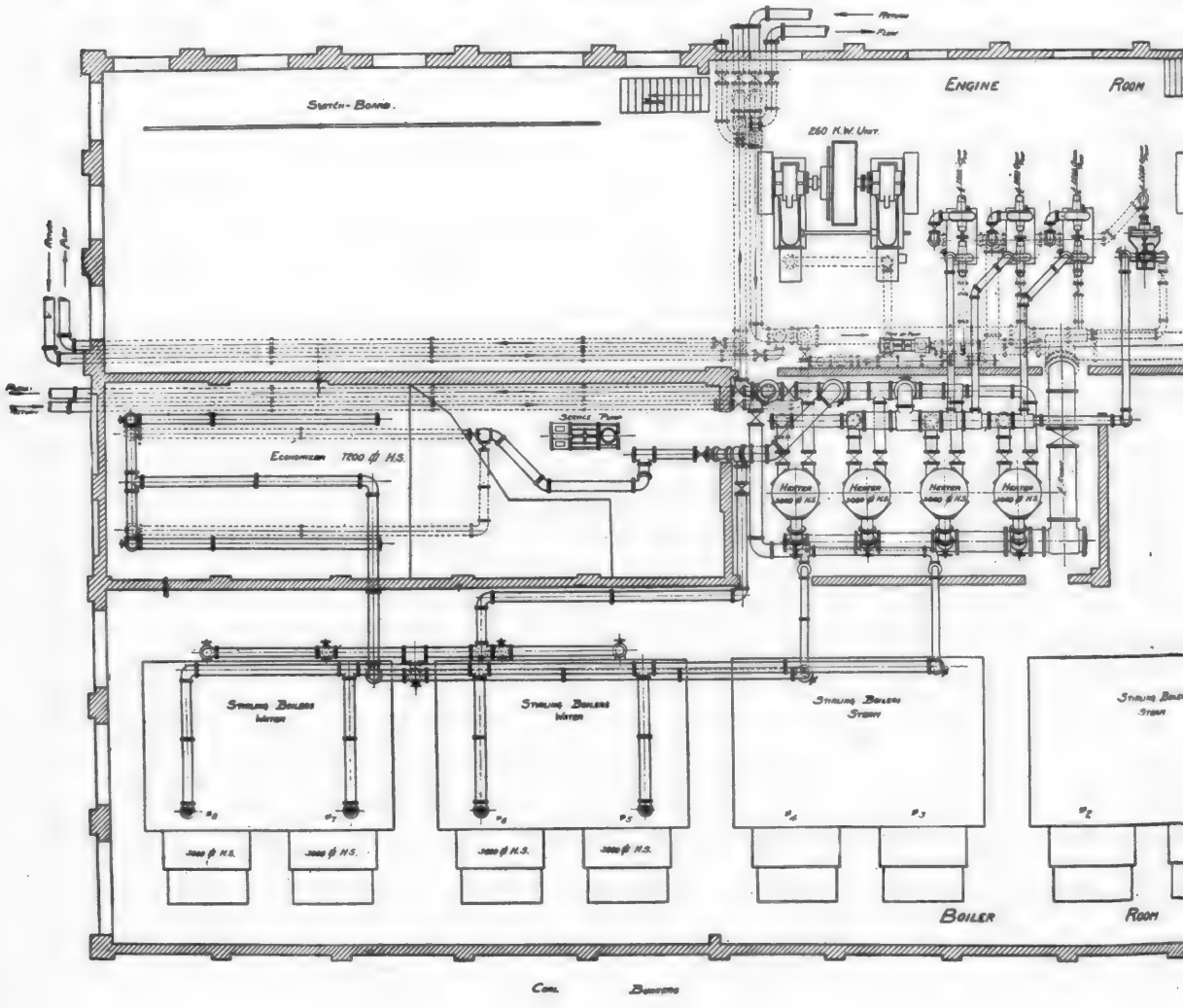
Our underground system is laid out in accordance with the standard Yaryan methods, being a complete two-pipe system. This piping is protected by means of a boxing built on all sides, with a double air space. The lumber used for this boxing is rough sawed hemlock, and is preserved by means of being dipped in crude oil before being made up. In addition to this covering we fill the boxing around the pipes with oiled shavings, securely tamped in, in order to obtain the best possible insulating results. We now have approximately twelve miles of two-pipe heating mains, located as shown by our map, size and capacity of same being as given below:

6,288	ft. of	2-in.	mains.
7,470	ft. of	3-in.	mains.
31,771	ft. of	4-in.	mains.
6,649	ft. of	6-in.	mains.
1,934	ft. of	8-in.	mains.
4,739	ft. of	10-in.	mains.

Connected to the above mains we are now, as already stated, successfully heating 710 houses, these having a combined connected load of 550,000 sq. ft. of radiation.

METHOD OF HEATING WATER.

Our plant now consists of two Westinghouse turbo generators, one



GENERAL PLAN OF HEATING SYSTEM, PUBLIC SERVICE

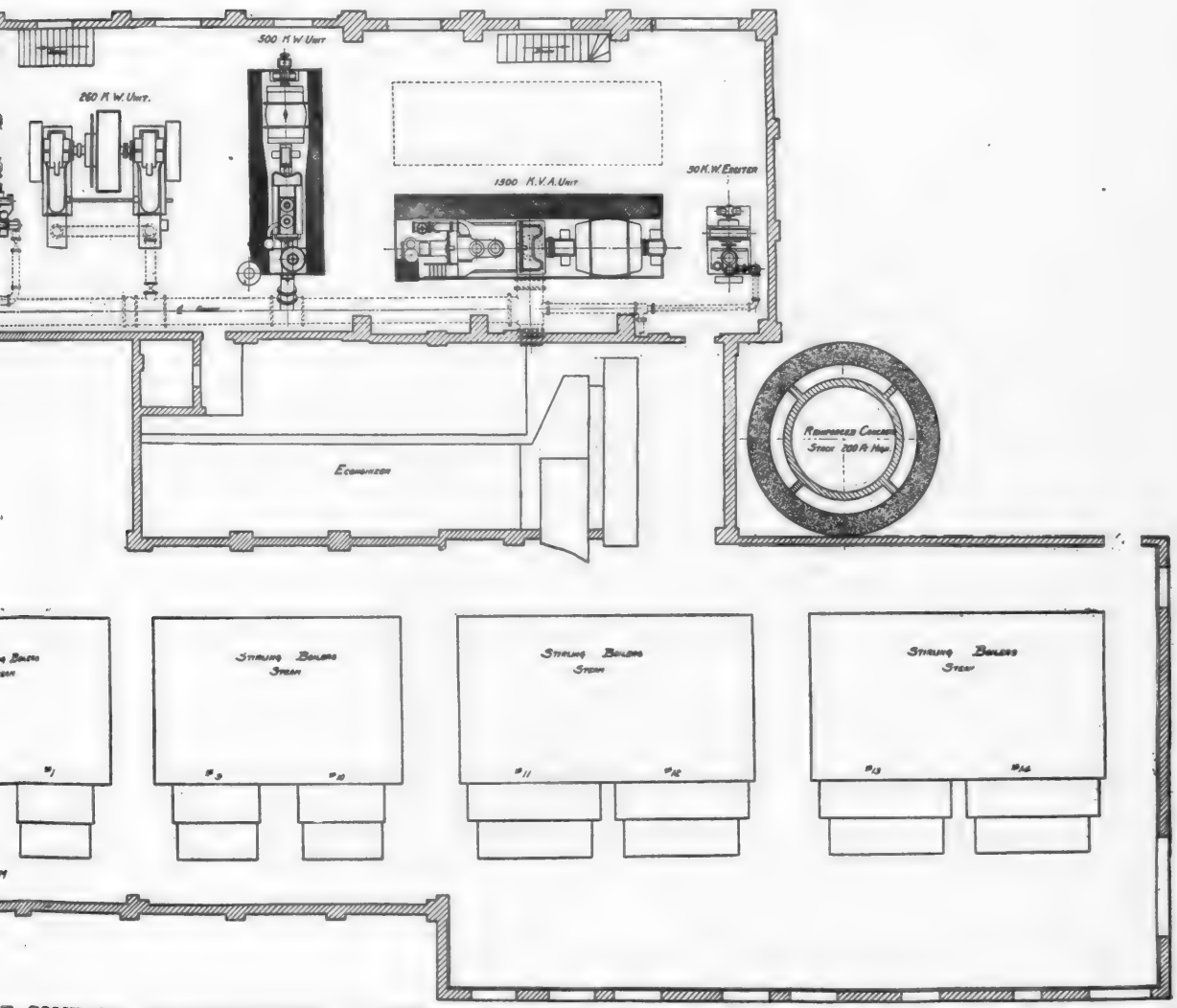
having a capacity of 1,500 K. V. A., the other 500 K. W.; both 2,200 volts, 3 phase, 60 cycles. Besides the above mentioned alternating current generators, we have two Ball Wood reciprocating engines connected to Western Electric direct current, 260 volts, 250 K. W. generators.

The exhaust from the combined steam-driven machinery is discharged into four Worthington heaters, which can be run in either multiple, or series, or singly, as the case requires.

These heaters have a combined heating surface of 12,000 sq. ft. and are sufficient to take care of the entire heating system during mild weather, the heating boilers and economizer being used only at times when weather conditions are sufficiently severe to require their use.

SCHEDULES FOR REGULATING FLOW AND RETURN TEMPERATURES.

A table shown herewith gives the schedule which we follow during the heating season and by which method we have obtained very good results. Also, several sketches showing the piping arrangements in houses to which we furnish service. Some of them, of course, give poor results, due to complications and short circuits. In connection with these sketches, one is included which is practically in accordance with our standard methods, and, if installed properly, gives absolute satisfaction.



E COMPANY OF NORTHERN ILLINOIS, OAK PARK, ILL.

COMPARATIVE ANEMOMETER REPORT, U. S. WEATHER BUREAU AND OAK PARK L. H. & P. CO. STATION

	Weather Bureau Report — Daily Average			Station Report — Indicated on Gauges			
1910 Nov.	Vel. Miles per Hour	Direction	Schedule Required	Vel. Miles per Hour	Direction	Schedule Required	Schedule Operated
1	16	S.	3	5 to 10	S.	2	2½
2	14	W.	3	5 to 10	W.	2	2
3	9	N. W.	2	5 to 10	N. W.	2	2
4	7	S.	2	5 to 10			
5	9	W.	2				
6	7	W.	2				
7	9	W.	2	5 to 10	W.	2	3
8	6	S.	2	5 to 10	S.	2	2
9	16	S. W.	3	5 to 10	S. W.	2	3
10	18	N. W.	3	10 to 20	W.	3	3
11	19	N. W.	3	10 to 20	N. W.	3	3
12	15	N. W.	3	5 to 10	N. W.	2	2
13	6	W.	2	0 to 4	N. W.	1	1½
14	13	N. W.	3	5 to 10	N. W.	2	2
15	13	N. W.	3	5 to 10	N. W.	2	2
16	11	W.	3	5 to 10	N. W.	2	2
17	12	S. W.	3	5 to 10	W.	2	2
18	10	N. W.	3	5 to 10	N. W.	2	2
19	8	S.	2	0 to 4	S.	1	2
20	13	S.	3	5 to 10	S.	2	2
21	16	W.	3	5 to 10	W.	2	2
22	11	S.	3	5 to 10	S. W.	2	2
23	19	S. W.	3	10 to 20	W.	3	3
24	15	S.	3	5 to 10	S. E.	2	2
25	12	W.	3	5 to 10	N. W.	2	2
26	16	E.	3	5 to 10	S. E.	2	2
27	14	S. E.	3	10 to 20	S. E.	3	2
28	18	N. W.	3	10 to 20	N. W.	3	3
29	16	N. W.	3	5 to 10	N. W.	2	2½
30	25	N. W.	3	10 to 20	N. W.	3	3

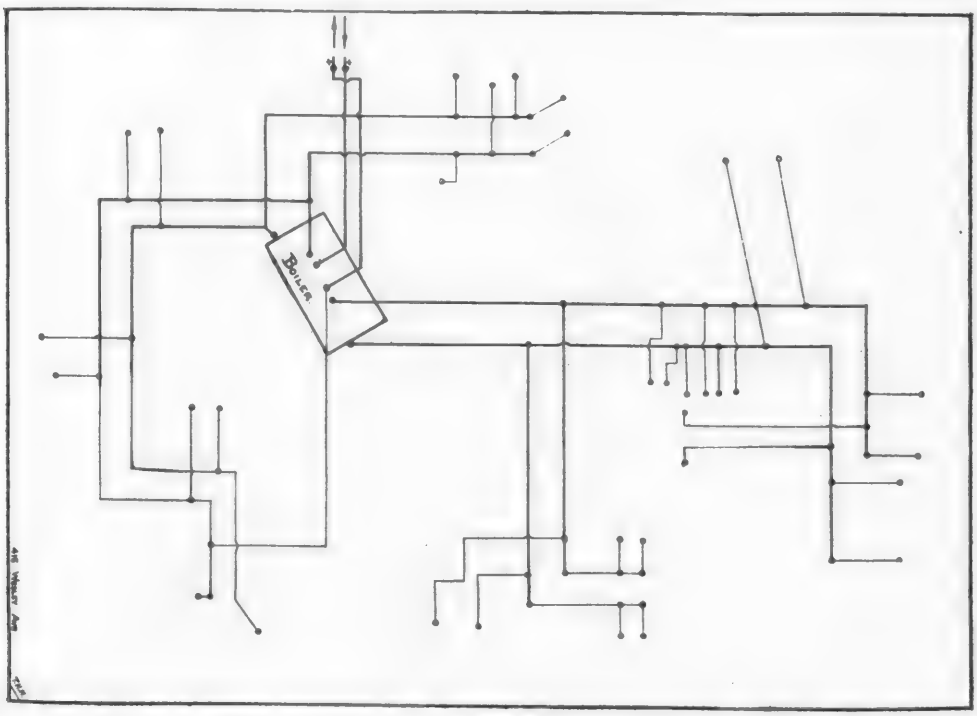
HOT WATER SCHEDULE.

	1 For a Preceptible Wind, 0 to 2 Miles			2 Gentle Breeze, 3 to 10 Miles			3 Brisk Wind 10 to 20 Miles		4 Very High Wind 25 to 50 Miles	
Outside Temperature Deg. F.	Pressure Lbs.	Temp. Flow Deg. F.	Temp. Return Deg. F.	Pressure Lbs.	Temp. Flow Deg. F.	Temp. Return Deg. F.	Temp. Flow Deg. F.	Temp. Return Deg. F.	Temp. Flow Deg. F.	Temp. Return Deg. F.
65	32	120	100	32	135	118	145	112	155	127
60	32	125	110	35	140	120	150	125	160	130
55	33	135	118	35	145	122	155	127	165	132
50	33	145	122	35	150	125	160	130	170	135
45	33	150	125	35	155	127	165	132	175	137
40	35	155	127	40	160	130	170	135	180	140
35	35	160	130	40	165	132	175	137	185	142
30	35	165	132	40	170	135	180	140	190	145
25	35	170	135	40	175	137	185	142	195	147
20	40	175	137	45	180	140	190	145	200	150
15	40	180	140	45	185	142	195	147	205	152
10	40	185	142	45	190	145	200	150	210	155
5	45	190	145	47	195	147	205	152	212	156
0	45	195	147	47	200	150	210	155	215	156
— 5	45	200	150	47	205	152	212	156	217	157
—10	45	205	152	47	210	155	215	156	220	158
—15	45	207	153	47	212	156	217	157	227	162
—20	47	210	155	48	215	156	220	158	229	163

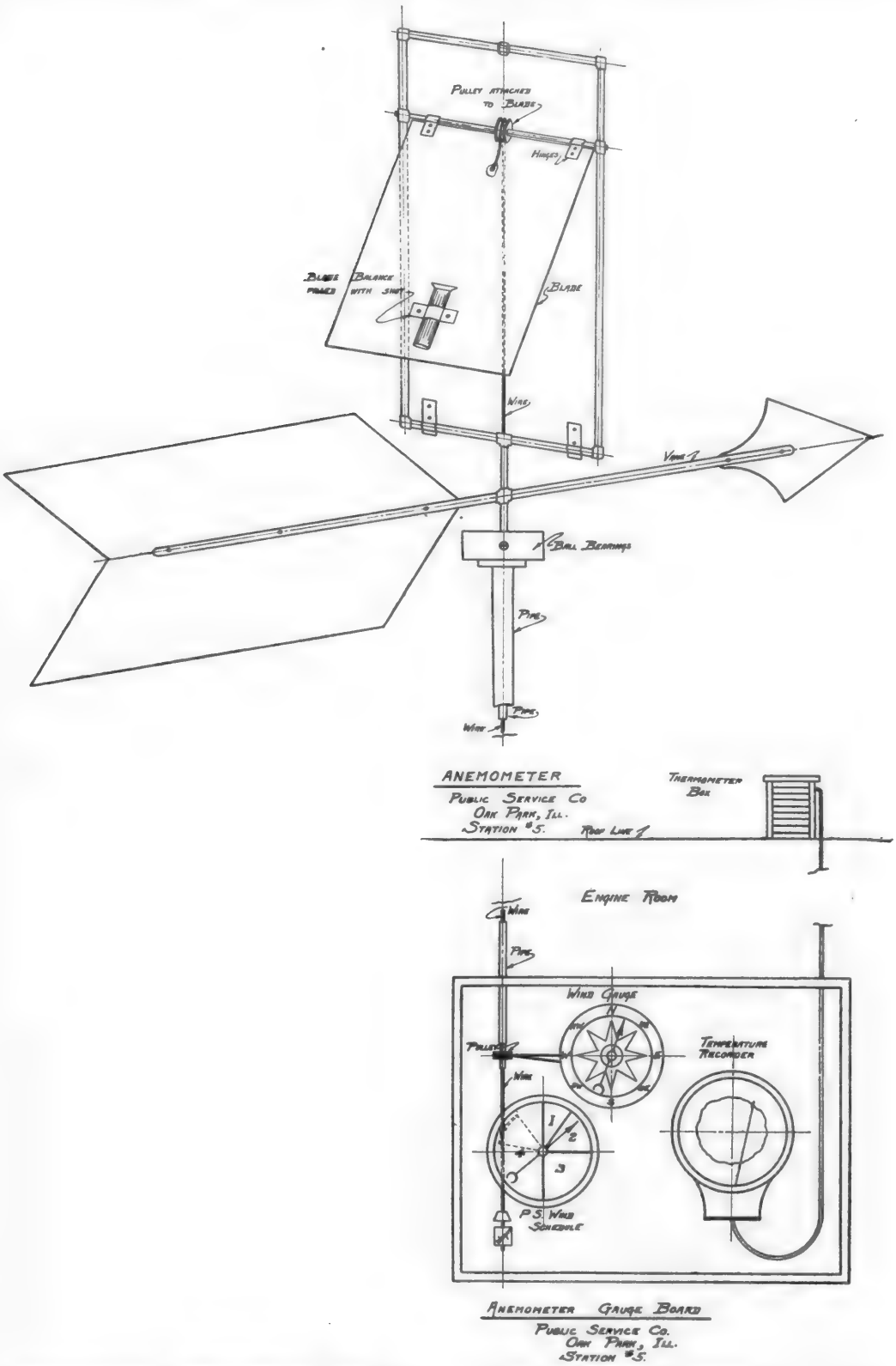
ASSUMED ACTUAL DISCHARGE OF CIRCULAR ORIFICES IN GALLONS PER HOUR AT PRESSURES INDICATED.

(62% of Ellis's Theoretical Table.)

Lbs. Pressure	Diameter, Inches											
	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
15	17	67	150	269	419	602	819	1067	1674	2421	3289	4315
16	17	69	154	277	431	621	844	1102	1726	2497	3396	4449
17	18	71	159	285	444	640	869	1137	1778	2573	3489	4683
18	18	73	164	294	458	659	895	1172	1830	2650	3592	4717
19	19	76	168	300	467	678	920	1207	1882	2726	3693	4751
20	19	78	173	310	484	696	944	1239	1931	2790	3788	4924
21	20	79	177	326	507	712	968	1270	1980	2866	3884	5096
22	20	81	181	334	520	728	991	1299	2026	2931	3973	5208
23	21	83	185	337	525	744	1013	1327	2072	2997	4072	5319
24	21	85	190	340	531	761	1036	1356	2119	3063	4152	5431
25	22	87	195	347	542	777	1058	1384	2165	3128	4241	5543
26	22	88	198	353	552	791	1082	1410	2206	3188	4328	5654
27	23	90	203	360	563	805	1103	1439	2247	3250	4412	5766
28	23	92	207	367	574	819	1125	1469	2288	3311	4500	5878
29	24	94	212	373	585	833	1146	1495	2328	3366	4584	5989
30	24	96	213	379	592	848	1160	1521	2369	3430	4650	6100
31												
32	25	99	223	391	614	876	1203	1570	2448	3538	2812	5287
33												
34	25	101	227	404	613	904	1237	1618	2522	3650	4948	6510
35											5022	
36	26	104	234	415	649	930	1272	1667	2593	3753	5088	6696
37												
38	27	107	240	427	667	956	1307	1711	2644	3850	5228	6845
39												
40	28	110	246	439	685	982	1342	1756	2738	3943	5327	7031



TYPICAL PIPING CONNECTIONS FOR RESIDENCE, OAK PARK, ILL., IN WHICH OLD BOILER IS MADE PART OF SYSTEM.



HOME-MADE ANEMOMETER USED AT PLANT OF PUBLIC SERVICE CO. OF NORTHERN ILLINOIS.

A Home Made Anemometer

A device built on novel lines that indicates not only the velocity of the wind but its direction as well is in successful use in the hot water heating plant of the Public Service Company of Northern Illinois, at Oak Park. It was described by G. E. Chapman at the recent meeting of the National District Heating Association and is the apparatus used to determine the varying water temperatures carried at this plant.

"When it became apparent," said Mr. Chapman, "that the wind had a whole lot to do with varying the temperature and the pressure and the operation of the plant, we came to the conclusion that we would have to have some kind of a scheme to tell the engineer when the wind was blowing."

The principal feature of the apparatus is a sheet of aluminum, about 18 ins. long by about 10 ins. wide, located on the roof of the power house and exposed to the wind. A weather vane is attached which serves both to keep the sheet in the wind and to indicate the wind's direction. The sheet is supported by a frame made of piping. A pulley is attached to the top of the sheet, as shown in the illustration and a cord extends from a point near the top of the sheet, over the pulley and then down to a gauge in the engine room. This is an old steam gauge with the works taken out and a special dial inserted, divided into four equal sections and numbered accordingly. When the aluminum sheet swings out, due to the wind pressure, the cord falls, permitting the gauge hand to turn to a correspondingly degree.

By carefully calibrating the instrument and comparing the results obtained with those of the local United States Weather Bureau, it was found that the instrument indicated quite accurately the velocity and direction of the wind.

As stated in Mr. Chapman's paper, the company changes the temperature and pressure of its hot water heating supply to conform with the wind, because it was found much easier for instance, to supply the entire system with heat when the temperature was below zero and no wind blowing than when it was 10 degrees, with a stiff wind.

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*Sources of Trouble in Customers' Installations**

By WILLIAM E. DARROW.

MERCHANTS' HEAT & LIGHT COMPANY, INDIANAPOLIS, IND.

In ten years the Merchants' Heat & Light Company of Indianapolis has developed the largest system of exhaust steam heating in the United States. At the present time more than twelve miles of steam mains and tunnels have been constructed, and more than 1,000,000 sq. ft. of radiation is connected to the system.

The company operates two plants, electric lighting plants, connected by 30 in. and a 20 in. steam main. The larger plant has 10,000 B. H. P. and the smaller one 2,000 B. H. P.

The equipments of the power plants of the Merchants' Heat & Light Company are suitable for heating. We have a 8,000 H. P. Corliss engine set, which operates eight months on heating mains and the remaining four months on a jet condenser and two turbines of the condensing type, and two that are non-condensing. The latter operate through the heating season and are held for reserve during the summer months. We have recently placed our order for a 10,000 H. P. turbine of the bleeder type, which will operate during the winter on heating and in summer on a jet condenser.

From the above description you will see we have what might be termed a flexible power plant; that is, we can operate condensing or non-condensing with utmost efficiency. Experiment

*Read at the fourth annual convention of the National District Heating Association, Detroit, Mich., June 25-27, 1912.

and the experience have taught us that in purchasing apparatus for a plant of the heating type, always to purchase apparatus which will serve the year through and which will not necessitate carrying the investment cost through the respective idle seasons.

An area of about four square miles is served from our system, the most remote service being about two miles from the boiler plant. This service is supplied to department stores, public buildings, theatres, hotels, apartments, private houses, and in fact to all class of service.

The service includes steam for heating and cooking and for producing hot water. The rapid growth of this system has done much for a cleaner and brighter Indianapolis, and with the present trend and demand, there will not be a single private boiler plant in the business district at the expiration of another five-year period.

THREE PRINCIPAL DIVISIONS OF HEATING SYSTEM.

A heating system primarily includes three principal divisions: 1st, a fuel burning plant; 2d, a transmission system and 3d, a diffusion system. It is with the 2d and 3d divisions that we are particularly concerned to-day.

An exhaust system of steam heating is necessarily a low pressure system, and it is used only for the purpose of conserving and selling the heat in exhaust steam that would, unless the power plant is fitted for condensing, go to waste. Even then we are prone to forget the continual cost of condensing the steam in order to gain a few per cent. more efficiency at a sacrifice of maintenance on condenser and water cost.

The specifications and requirements of our company include the designing of the customer's installation in such manner that with 1 lb. pressure at service valve, a temperature of 70° F. can be maintained, when the outside temperature is 10° below zero.

LACK OF RADIATION A COMMON FAULT.

This requirement brings us to one of the first difficulties with customer's installation—lack of radiation and insufficient pipe capacity for zero weather conditions. The company has for years conducted a campaign of education for architects and piping contractors along these lines, and to this end has insisted that plans be submitted to the company's engineering department to be checked up before a contract for heating would be accepted. To-day we find architects and contractors more than willing to shift this burden to the company, and in no case during the past ten years, where the company's requirements have been met, has there been any complaint of service. The doctrine of ample mains and risers and sufficient radiation is a guaranty of a satisfied customer.

TOO LITTLE ATTENTION PAID TO AIR VALVES

Again too little attention is paid to the air valves on radiators. In order that radiators may be active, the air valves must be sensitive so that they will respond quickly to the cooling that takes place with an air accumulation.

We also require every customer's installation to be equipped with at least one thermo-control valve. The valve is usually placed near the point of entry of the service to the building and is controlled by a thermostat at the most suitable location. Unless otherwise ordered, it is set for 70° F. On streets where we have air pressure lines, we use the Powers regulating valve, in districts where we have no air, the Sylphon Regitherm control, which is entirely mechanical and self-contained.

On account of the initial cost many try to evade the installation of these control valves, but we believe that success and economy of central station heating are largely dependent upon such factors. (15% to 30% saving.)

The most satisfactory item is steam heating from the consumer's point of view is a constant temperature and also it is the most economical method for the company. This result is only attained through the medium of a

master regulating valve, which is automatic.

Another factor is the cooling or economizing coil. This again is a requirement that has to be insisted upon in many cases. 15% to 20% of the total radiation must be in the form of cooling coils. This is partly due to the company's desire to utilize all the heat possible in the steam supplied and partly because the city's ordinances require that the trap discharges shall not exceed 125° F., the company's aim is always to get the last heat unit from the steam.

In the above I have attempted to point out briefly some of the things which require care in the customer's installations. Leaving the customer's installation and passing to the street, we find three important requisites for construction of pipe lines.

IMPORTANT REQUISITES FOR CONSTRUCTION OF PIPE LINES.

1st. Drainage or removal of all water accumulations from possible contact with the steam lines.

2d. Provision for expansion, and

3d. Insulation.

I think within the past ten years we have tried all kinds of construction generally known and used, and from the experience, we have developed a construction of our own which has both a minimum first cost and a degree of permanence only exceeded by the most expensive tunnel construction.

Our 30 in. lines are all in tunnels, but for the sizes 20 in. and down, we have adopted for the outer wall ordinary sewer tile, split longitudinally in half. For example, on a 20 in. line, we use a 27 in. sewer tile. The lower half of this tile is laid to grade and the half joints at bell are cemented. On the bottom of tile are laid the cast iron expansion rollers and plates, then the pipe is put in place and insulated with 1½ in. covering. Then the top of the sewer tile is placed in position and cemented. This form of construction while not what we usually call tunnel construction, is to all purposes the same, covering all the points.

Expansion joints and traps are placed in man holes approximately 200 ft. apart. Considerable care and inspection are required to keep expansion joints and traps in perfect condition. We find these items, however, of vital importance to good service and economical operation.

For covering of street mains, the insulation must be fireproof, water proof and flexible to a slight degree. We have lately adopted a mineral covering for our pipes which we believe more nearly approaches the ideal covering than any heretofore offered. It is a sectional moulded covering, has an insulating quality as good as 85% magnesia, is apparently not mechanically injured by repeated wettings and dryings, and has high heat resisting qualities.

We have had the usual experience with wood shavings, mineral wool, pumplog, wood boxes, felt, asbestos and tar paper, etc. The life has gone out of all of these in a short space of time. We find any insulation which is not strictly mineral has great deterioration, due to gases, escaping gases, ordinary decay and electrolytic action.

You will readily understand that heat loss in underground mains is very nearly a constant amount and cannot be expressed as a fixed percentage of total steam generated for the reason that, when the consumption is large, the loss percentage is small and vice versa. Experiments and calculations made by the writer indicate our line condensation losses at 10% of amount delivered to heating main.

In conclusion, it is hardly necessary to say that we have passed through years of pessimism as to the feasibility and financial success of central station heating. The necessity for central station heat is becoming more and more apparent. The amount of heat and the length of the heating season are factors depending on the climate and custom. On the continent of Europe 60° F. is considered comfortable, while here in America, we say 70° F.

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WHEN a report is made public like that recently prepared by a firm of consulting engineers on the condition of New York City's public school buildings, the first impression is one of amazement that a competent engineering staff could permit the adoption of any but the best practice in the design and mechanical equipment of such buildings. As far as the general public is concerned, snap judgment is easily taken and, in this case, a feeling of justification for its recent criticisms is widely expressed. To those familiar with the conditions, it is, of course, well known that the building bureau is distinctly limited in its adoption of much apparatus that is now recognized as essential in an up-to-date mechanical equipment. Washed air, for instance, costs money, and, in a department that is constantly reminded by those higher up that building expenses must be reduced at every possible point, it is scarcely to be wondered at that features of incompleteness may be discovered in many plants installed.

This, however, does not dispose of those items included in the report relating to unnecessary complication of design and overlapping of supervising and inspection duties nor of the matters of uneconomical fuel consumption and of excessive electric current costs.

A possible fuel saving of over a quarter of a million dollars per year, which is one of the predictions contained in the report as a result of adopting its recommendations, is about as sensational a statement as could be made in an enginering way. On the other hand the proposed reduction in cost of electrical current is a business detail, pure and simple. Fortunately, an opportunity will be provided the consulting engineers to test their theories regarding a possible fuel saving, an appropriation of $10,000 for that purpose having been made.

PARTICULAR interest attaches to the recommendations in the New York school report that the work of the chief architect and of the engineering department be practically divorced. This is another way of approaching the problem taken up recently by the heating engineers' society when it advocated the concentration, under one head, of the designing and operating forces in the New York public schools. Under the plan now proposed, a "mechanical superintendent of schools" will have jurisdiction over the various designing departments for mechanical equipment and, in addition, will control the operating force directly through a "superintendent of operatives."

HEATING AND VENTILATING ENGINEERS AT DETROIT, MICH., JULY 11, 1912.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Semi-Annual Meeting, Detroit, Mich., July 11-12, 1912

A programme of no less than eleven professional papers on subjects bearing directly on the work of the heating engineer, in addition to numerous topics for discussion and committee and chapter reports, filled every spare moment of the mid-summer meeting of The American Society of Heating and Ventilating Engineers, held in Detroit, Mich., July 11 and 12, 1912.

Detroit was at its prettiest during the two days of the meeting, the weather being delightfully mild and clear. This enabled the entertainment features to be carried out quite as planned and they were highly enjoyed by the 100 delegates in attendance.

In the absence in Turkey of President John R. Allen, the meeting was called to order on the roof garden of the Hotel Tuller, Thursday morning, July 11, by Vice-President John F. Hale. Mr. Hale, in his opening remarks, contrasted the membership in the society with what it was when the society last met in Detroit in 1904. At that time there were 209 members of all grades while the present membership totals 444.

Acting President Hale then read a message from the absent president in the form of a paper written by Prof. Allen on "Heating in Turkey." The paper was an interesting review of the backwardness of Turkey in the use of house heating appliances. The principal reason for this, as explained by Prof. Allen, is due to the fact that the Turk is a fatalist.

"Everything that happens in Turkey," said the writer, "is the will of Allah. The Turk builds a house of

wood and paints it. The paint wears off, the boards begin to rot and finally fall off, but no repairs are made, because it is the will of Allah that all things should decay and pass away."

Under the rule of the "Young Turk," however, some of these conditions are gradually passing away and in Constantinople new office buildings are being constructed and many new ones are being planned. These buildings are being equipped with modern appliances and many of them are quite up-to-date in their equipment.

"The Turkish houses as a rule," said Prof. Allen, "are built without provision for any form of heating. There are no chimneys in the ordinary Turkish house and many of the houses being built to-day are still constructed without chimneys. The forms of heating used in the ordinary Turkish house are such as do not require a chimney; the same is true of their means of cooking which is usually done over a charcoal fire.

"The fire is started in a pan outdoors, and when the coals are burning well, they are brought into the house and placed on a grate held by a brick or stone shelf. A separate fire is made for each cooking utensil, and, for an elaborate meal, as many as ten or twelve separate fires are used. The American cook stove is unknown in Turkey.

"The heating in the Turkish houses is done with open charcoal fires. In the better houses these fires are made in elaborate mongols. These mongols are usually made of copper or brass and are raised from the floor on a standard or on legs. They look much more like jardiniere stands than like stoves. The fire is started out of doors, and when it is burning brightly is brought into the house and put into the mongol. It will burn for an hour or two without replenishing.

"There is a great lack of heating contractors in Constantinople. There are only two concerns that really construct a good heating installation in this city of over 1,000,000 inhabitants, and in a climate where heating is necessary from November till May

"Central heating in Turkey has been limited almost entirely to the heating of public buildings. The Turk has yet to be educated to heating his residence by central heat. There should be a large field for the hot air heating system, but as yet this system is unknown in Turkey. This year we hope to install some of the first hot air systems of heating in the new residences to be built on the Robert College grounds.

"The American manufacturer has done but very little to push his trade in this market. It will not be difficult for him to compete with Europe, as the prices are much higher here than in America. Freight rates from England and Germany are almost as much as those from New York. The freight rate on machinery from London to Constantinople is 25 shillings per ton, and from New York to Constantinople, 27 shillings per ton."

CHAPTER REPORTS.

The reports of the Illinois, New York and Massachusetts Chapters were then presented, Samuel R. Lewis reading the Illinois report, Joseph Graham the New York report, while H. W. Whitten told of the season's activities of the Massachusetts Chapter.

COMMITTEE REPORTS.

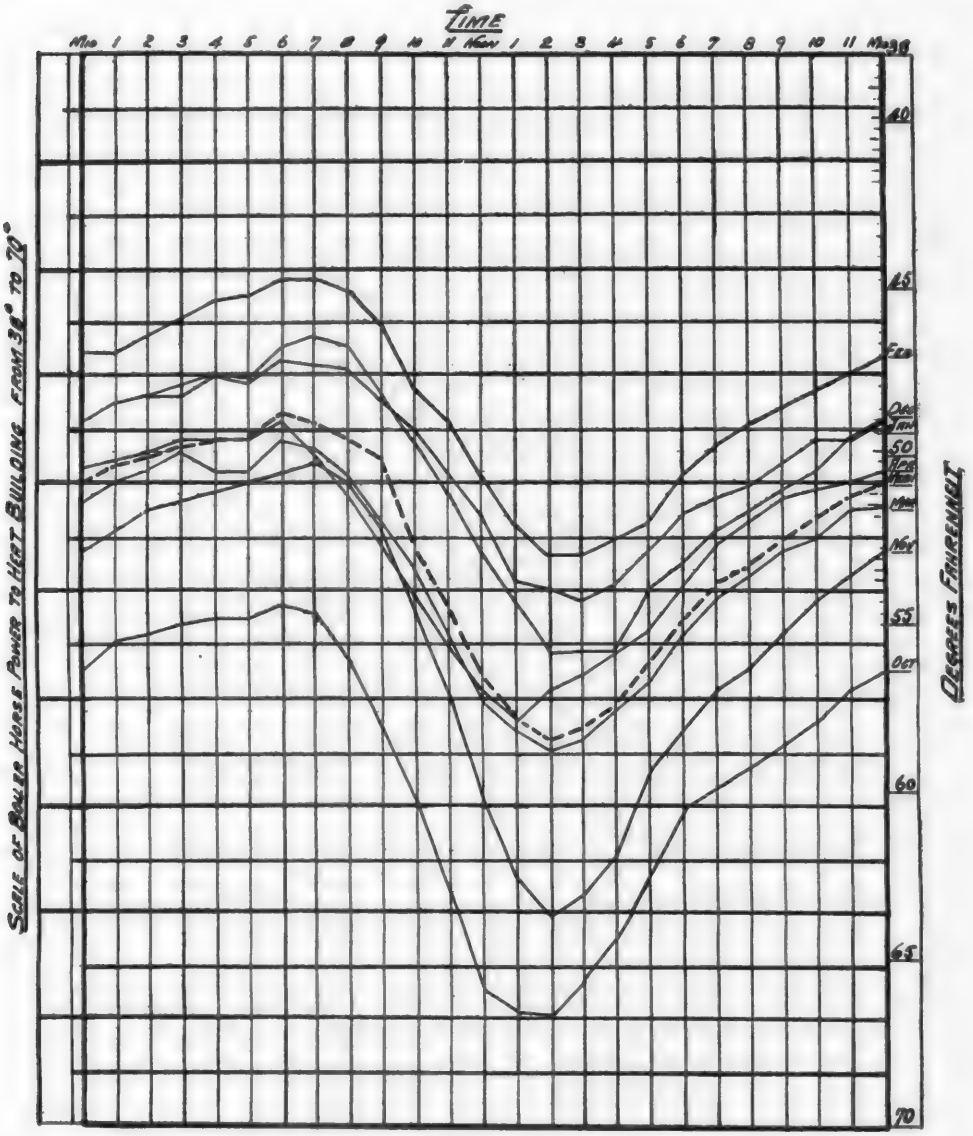
For the sub-committee on code for testing house heating boilers, Chairman E. A. May said that the committee was working to give a final report in January next and asked for suggestions on testing house heating boilers. He said the committee felt the lack of material which had been collected by previous committees but which was not available and felt that such data should be deposited in the society's archives so as to avoid needless repetition of research work to determine what had already been accomplished.

Standard Minimum Outside Temperatures.

For the committee on standard outside minimum temperatures, Chairman Reginald Pelham Bolton sent on a report which was read by Secretary W. W. Macon, and was as follows:

Your sub-committee presents a report of progress and anticipates the presentation of a much more complete statement upon the subject assigned to its attention at the annual convention next January. Since the appointment of the committee, the work of which is necessarily conducted by correspondence, the chairman has suggested to each of its members the collection of a local record of temperature variations during a complete heating season, to be later supplemented, if possible, by similar records over a number of such seasons.

Following out the method pursued by the chairman in compiling comparative data on this subject in New York city, each committeeman has been asked to obtain records from the local weather department, or any other local source, of the hourly variations, so that a curve can be plotted for the


TIME
Mid 1 2 3 4 5 6 7 8 9 10 11 Noon 1 2 3 4 5 6 7 8 9 10 11 Mid
40
45
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65
70
SCALE OF BOILER HORSE POWER TO HEAT BUILDING FROM 32° TO 70°
DEGREES FAHRENHEIT

HOURLY VARIATIONS OF HEATING WORK IN SAN FRANCISCO, ACCORDING TO TEMPERATURE FLUCTUATIONS DURING 1911.
Computed from Data Supplied by Prof. A. G. McAdie, U. S. Weather Bureau, San Francisco. Average Hourly Wind Velocity for 1911, 8.2 Miles.

average hourly temperature variations for each month of the heating season. The purpose of this method is to bring out not merely the minimum temperature on any one occasion, but the period of the day in which the occurrence is found to take place. One of the members of the committee, Thos. F. Morrin of San Francisco, has secured this information, through the courtesy of Prof. A. McAdie of the United States Weather Bureau of San Francisco, and in order to illustrate to the members of our society the line of information to be derived from such data, a chart is submitted herewith showing the mean hourly variations of temperature for each month during the heating season, in the district of San Francisco. An observation of this set of curves shows that the same general characteristics are found to exist in temperature variations, as have been noted in the New York observations above referred to—namely, that the lowest temperatures prevail during the earliest hours of the day, and that a sharp rise takes place after 7 A. M. in all of the curves. It is interesting to note that the lowest observed temperature during the season of 1911 thus recorded is 38°—a very isolated and temporary occurrence.

By reversing the curves on the diagram and placing them upon a scale divided into tenths it can be utilized as a scale of boiler horsepower required to heat a building from the minimum of 38° to 70°, thus affording the means of determining the average monthly work to be done in the heating of a building, and the variation of that work between the hours of the night and those of the day time.

The important element of wind movement has not been disregarded and observations will, it is hoped, be available from each of the committeemen's districts, throwing some light on wind direction and velocities. In the case of San Francisco, it is observable that the average hourly velocity for the season of 1911 was 8.2 miles, which accords very closely with the mean recorded for air movement in the vicinity of New York. The committee hopes to bring together a number of similar sets of observations which will afford a basis for the collection of similar data covering the whole country, which may eventually be summarized in climatic sections where practically similar conditions are found to exist, so that the entire country may be mapped with a view to its heating requirements.

For the sub-committee on ventilation standards for moving picture theatres, Chairman Frank T. Chapman promised an extended report at the January meeting. At the suggestion of Acting President Hale, the name of E. L. Hogan, of Chicago, was added to the committee.

For the committee on tests, Chairman L. C. Soule referred to some figures that had been obtained by J. A. Donnelly. Mr. Donnelly stated that the figures were the results of tests made by the Rochester Railway, Light & Power Co. on the amount of steam required to heat factory buildings, both with live and with exhaust steam. The curves and data, he stated, show that more coal was used when the engines were running and the exhaust steam used for heating than when electric current was taken from outside and live steam only was used for heating.

Another series of tests on radiator steam traps were reported by Mr. Donnelly as having been made by Charles J. Jackson of Chicago at the Department of Steam Engineering, University of California, Sacramento, Cal. The data included charts showing the testing apparatus. Mr. Donnelly recommended that a standard method be adopted for making such tests.

For the committee on compulsory legislation, General Chairman James D. Hoffman said that it was proposed to standardize the essential requirements of compulsory ventilation laws for the use of the various state committees. The committee intended to present these proposed standards at the January meeting of the society. The society's approval of such standard requirements would be very help-

ful, Prof. Hoffman, added, in furthering legislation on this subject.

H. W. Whitten called attention to the fact that the time for submitting bills to the Massachusetts legislature will expire before the date of the society's next annual meeting, January 8 being the last day for the submission of bills.

For the committee on heating guarantees, W. M. Mackay suggested that the report submitted at the last annual meeting be printed and sent out to the members for suggestions and criticisms.

Owing to the absence of Chairman Frank Irving Cooper, there was no report from the committee on school room ventilation.

COMMITTEE APPOINTED TO CONFER WITH DISTRICT HEATING ENGINEERS.

Acting on a letter from D. L. Gaskill, secretary of the National District Heating Association, announcing the passage of a resolution by that body for the appointment of a committee to confer with the heating engineers on educational lines, it was moved and carried that the society appoint a committee of five members to confer with a similar committee of district heating engineers.

1912 U. S. STANDARD FLANGE SCHEDULE.

A motion to reaffirm the position of the society regarding its endorsement of the 1912 U. S. Standard Flange Schedule for Standard and Extra Heavy Flanges and Flanged Fittings was discussed at some length, the position being taken that it was unnecessary to take action on a matter that had already been disposed of. It was at length voted to have the society recommend to its members and to other heating and ventilating engineers that they use and specify the 1912 U. S. Standard schedule.

On motion of Prof. Hoffman, it was voted to send greetings to President John R. Allen and to thank him for his paper on heating conditions in Turkey.

NOMINATING COMMITTEE ELECTED.

Acting under the new constitution, which was recently adopted, it was necessary to elect a nominating committee at the mid-summer meeting, to place in nomination officers for the year commencing in January next. The following were elected: H. W. Whitten, Boston, chairman; Charles F. Newport, Chicago; F. R. Still, Detroit; Joseph Graham, New York, and George Mehring, Chicago.

The remainder of the session was devoted to the paper of H. W. Whitten's on "Temperature Equivalents of Wind Velocities."

Afternoon Session, July 11.

The afternoon session was devoted to the reading of professional papers and to a topic for discussion relating to upward and downward ventilation. The papers included:

"The Time Element in Heating Apparatus," by J. A. Donnelly.

"Office Practice in Estimating Heating and Ventilation," by John D. Small.

"Heating and Ventilation of a Mitten Factory," by Samuel R. Lewis.

"Humidity in Relation to Heating," by L. C. Soule.

"Brick Drying," by H. C. Russell, read by abstract by Secretary Macon.

"Ventilation of a Dispensary Building," by A. M. Feldman.

Morning Session, July 12

The first paper read at the Friday morning session was on "Removal of Refuse and Waste by Fans and Blowers," by F. R. Still. Other papers read at this session were:

"Methods of Automatic Humidity Control for Air Washers," by J. J. Lyle.

"Open Windows in Mechanical Ventilation," by Ralph C. Taggart, read by Secretary Macon.

"Heating and Ventilating the Northwestern University Buildings," by J. M. Stannard.

During this session announcement was made of an invitation from the Michigan Stove Company to visit its plant in Detroit and incidentally inspect its hot water heating plant.

It was also voted to send a message of greeting and sympathy to Andrew Harvey on account of his illness which prevented him from participating as a member of the entertainment committee. The resolution which was in-

troduced by F. R. Still. expressed the hope of the society for Mr. Harvey's speedy recovery.

On motion by Prof. Hoffman, a vote of thanks was extended to the local entertainment committee for the outing features that had contributed so much to the pleasure of all present.

The Entertainment.

In a balmy temperature and under cloudless skies, the entertainment features, which had been carefully arranged by the local committee, were carried out in a manner that proved most enjoyable to all.

On Thursday afternoon, the opening day, a boat trip was arranged for the ladies to Bois Blanc Island, near the Lake Erie end of the Detroit River. After luncheon at the Casino on the island, the return trip was made in the afternoon.

In the evening all the members and guests were taken in sightseeing automobiles to Belle Isle. The start was made from the offices of the American Radiator Company on Jefferson Avenue and the route lay up Jefferson Avenue to the Belle Isle bridge and thence to the Casino on the island. The trip was made under the escort of A. G. Pittelkow and party in his private car, a fact that proved of importance later on when one of the main party became so rapt in the beauties of Belle Isle's canoe-filled canals and in the bewitching music of the orchestra that he overstayed his leave and the sight-seeing cars went on without him. It proved a blessing in disguise, however, for he was kindly taken in tow by Mr. Pittelkow and given a front seat in the latter's car. A rapid chase around the island after the main party proved fruitless, but as an exhibition of death cleverly avoided at various turns left an impression not soon to be forgotten. Those in the main party were afforded a view of most of Belle Isle's beautiful drives and lanes. Those in the pursuing car got the same view a la kaleidoscope, so to speak. In some manner, still to be explained, the main party was passed, but found later on Jefferson Avenue, on the way back to the city.

Friday afternoon was spent by the ladies in a trip around the city. Meanwhile the members were inspecting the plants of the American Blower Company and of the Ford Motor Company. Afterwards the members and guests proceeded by automobile to Palmer Park, where dinner was served at the Detroit Golf Club, followed by dancing. Through the courtesy of William F. McDonald, the privileges of the golf course were extended to the members of the convention.

On Saturday inspection trips were arranged to the Delray plant of the Detroit Edison Company, luncheon being served at the plant.

The local entertainment committee was composed of Ralph Collamore, chairman; William F. McDonald, R. C. Hargreaves, Andrew Harvey, A. G. Pittelkow, F. R. Still and A. W. Varney.

THOSE PRESENT

John F. Hale.....Camden, N. J.
E. F. Capron.....Chicago
W. W. Macon.....New York
James A. Donnelly.....New York
J. D. Hoffman.....Lincoln, Neb.
S. R. Lewis.....Chicago
W. M. Mackay.....New York
A. S. Armagnac.....New York
Chas. J. Peck.....Detroit, Mich.
Fred Venton.....Detroit, Mich.
Arthur W. Kelly.....Red Bank, N. J.
F. R. Still.....Detroit, Mich.
C. W. Daines.....Detroit, Mich.
E. W. Sanborn.....Detroit, Mich.
W. M. Foster.....Detroit, Mich.
A. W. Varney.....Detroit, Mich.
Joseph Graham.....New York
Howard T. Gates.....New York
E. A. May.....Chicago
O. T. Carson.....Chicago
H. L. Williams.....Pittsburg, Pa.
Jas. H. Davis.....Chicago
J. M. Stannard.....Chicago
L. C. Soule.....Chicago
J. D. Small.....Chicago
C. F. Newport.....Chicago
Frank T. Chapman.....New York
D. M. Quay.....Cleveland, O.
Joseph A. Bursley.....Ann Arbor, Mich.
Charles W. Locke.....Detroit, Mich.
Aaron Miller.....Kalamazoo, Mich.
Richard W. Alger.....Chattanooga, Tenn.
Theodore Weinshank.....Indianapolis, Ind.
Mark E. Monash.....New York
J. J. McDonald.....Cleveland, O.
J. O. Sargent.....Detroit, Mich.
John P. Berry.....Detroit, Mich.
T. Wilson.....New York
Abner E. Werkhoff.....Lafayette, Ind.
H. S. Van Valkenburgh.....Detroit, Mich.
Herbert W. Whitten.....Boston, Mass.
W. T. White.....Detroit, Mich.
E. A. Scott.....New York
Henry B. Gombers.....New York
J. M. Doesburg.....Milwaukee, Wis.
Donald Sturart.....Chicago
A. G. Pittelkow.....Detroit, Mich.
H. A. Hamlin.....Detroit, Mich.
J. B. Gaugh.....Detroit, Mich.
Harry J. Rademacher.....Detroit, Mich.
R. L. Douglas.....Boston, Mass.
P. A. Hoffman.....New York
J. E. Anderson.....Chicago
W. F. McDonald.....Detroit, Mich.
Ralph Collamore.....Detroit, Mich.
G. H. Kirk.....Chicago
S. O. Dugger.....Chicago
Joseph Meehan.....New York
J. G. Sorgen.....Richgrove, Cal.
E. P. Bradley.....St. Louis, Mo.
E. E. Walton.....Detroit, Mich.
James E. Degan.....Detroit, Mich.
John Boylston.....Chicago
N. A. Henwood.....Detroit, Mich
S. C. Cutler.....Cleveland, O.
E. D. Smith.....St. Louis, Mo.
T. C. Taylor.....Detroit, Mich.
F. B. Cox.....Detroit, Mich.
William J. Keep.....Detroit, Mich.
J. V. Dailey.....Detroit, Mich.
C. McSorley.....Detroit, Mich.
E. M. Harrigan.....Detroit, Mich.
T. E. Keegan.....Indianapolis, Ind.
E. J. Lomasney.....Detroit, Mich.
A. M. Minnick.....Detroit, Mich.
W. M. Kingsbury.....Cleveland, O.
C. H. Vitalius.....Detroit, Mich.
W. R. Brewer.....Cleveland, O.
J. F. Lewis.....Detroit, Mich.
Geo. D. Higgins.....Detroit, Mich.

James R. Bolton.....Detroit, Mich.
J. M. McHenry.....Detroit, Mich.
Frederick H. Mason.....Detroit, Mich.
Otto A. Wurm.....Detroit, Mich.
J. C. Kenney.....Detroit, Mich.
B. E. LaFollette.....Detroit, Mich.
Weston Wrigley .....Detroit, Mich.
William Lees .....Chicago
S. E. Fenstermaker.....Indianapolis, Ind.
Frank G. Phegley.....Cleveland, O.
J. H. Walker.....Detroit, Mich.
J. E. Lyle.....New York
A. C. Rogers.....Toledo, O.
H. W. Ellis.....Milwaukee, Wis.
W. H. Chapman.....Detroit, Mich.
Ralph T. Coe.....Windsor, Ont.

LADIES.

Mrs. W. W. Macon.....New York
Mrs. Ralph Collamore .....Detroit, Mich.
Mrs. A. G. Pittelkow.....Detroit, Mich.
Mrs. A. W. Varney.....Detroit, Mich.
Mrs. H. W. Whitten.....Boston, Mass.
Mrs. Jas. H. Davis.....Chicago
Mrs. A. W. Kelly.....Red Bank, N. J.
Mrs. Theodore Weinshank...Indianapolis, Ind.
Miss Anna Weinshank.....Indianapolis, Ind.
Mrs. E. E. Walton.....Detroit, Mich
Mrs. William Lees .....Chicago
Mrs. Weston Wrigley.....Toronto, Ont.
Mrs. Frank G. Phegley .....Cleveland, O.
Miss Phegley .....Cleveland, O.
Mrs. Donald Stuart.....Chicago

British Institution of Heating and Ventilating Engineers.

The summer meeting of the Institution of Heating and Ventilating Engineers was held at Southport, Eng., June 25 and 26, and was one of the best-attended gatherings in the history of the British association. Among the new members elected was Prof. John R. Allen, president of the American Society of Heating and Ventilating Engineers. One of the papers read was by A. H. Barker on "Observations of the Conditions of Guarantees."

The author explained that the object of this paper was to call attention to one of the problems of modern heating practice, namely, the methods at present in use for calculating heat losses from buildings and the use of these calculations for guaranteeing results. The author referred to the usual guarantee, which, in England, is that the heating apparatus will maintain an indoor temperature of 60° F., when the outside temperature is 30° F. He explained how leaky windows and poor construction often prevented the guarantee from being fulfilled, especially in such cases where the engineer made his calculations of heat losses from drawings only.

"Assuming that the engineer had given his guarantee," continued the author, "what is his position if he claims, as he naturally and justly would in these circumstances, that the cause of the poor result was the bad condition of the building? The client could and did say to him, "The building was open for you to inspect before you gave your guarantee and the responsibility is yours." It would be impossible for the engineer to make an effective answer to this contention.

ENGINEER SHOULD GIVE B. T. U. ONLY

In the author's opinion, the only satisfactory solution of this problem was that the engineer should only guarantee that he will furnish a scheduled number of B. T. U. to each room, and that the test should consist of a careful measurement of the temperatures in the flow and return pipes, the surface of the radiator, and the difference between the temperature of the room and of the radiator at the time. The B. T. U. emitted in such conditions should be calculated from standard co-efficients.

When the scheduled numbers of B. T. U. had been delivered to each room according to this calculation, then, and not till then, the engineer should be entitled to be paid, irrespective of the weather conditions at the time, and irrespective of the temperature of the room, which was only measured at all in order to determine the number of B. T. U. given off from the radiator. This guarantee could then be safely combined with a guarantee of fuel consumption, and such a guarantee would be strictly a guarantee only of the efficiency of the engineer's own apparatus and not of the quality of the customer's building.

This method emphasized the distinction between the two entirely separate parts of this problem. The one was the supply of a certain number of B. T. U. to each part of the building, at, if desired, the guaranteed maximum fuel consumption. This was strictly the work of the heating engineer, and he would have no reasonable ground of complaint when held strictly to this guarantee.

The other part, however, was the question whether that number of B. T. U. would maintain the desired temperature. This question depended solely on the quality of the building. It was entirely the client's own responsibility, and had nothing whatever to do with the heating engineer as such.

In closing Mr. Barker suggested that a committee be appointed by the institution to consider the subject.

Another paper presented at the meeting was on "The Determination of Pipe Sizes for Hot Water Heating," by Charles Knuth, Jr. of Budapest. This paper was a lengthy discussion of the subject comprising 53 printed pages and 22 tables. In the absence of Mr. Knuth, the paper was summarized by Mr. Barker and further discussion of it was deferred to the Autumn meeting, when it is hoped Mr. Knuth will be able to be present.

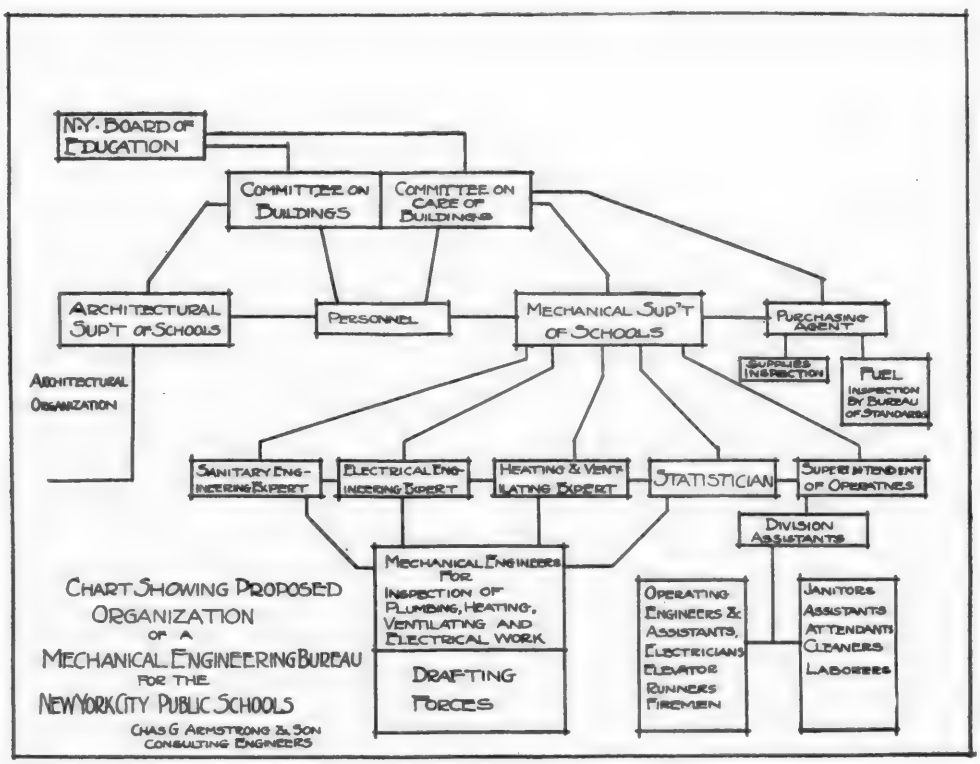
The annual dinner of the institution was held at the Prince of Wales Hotel, at Southport. On this occasion Prof. W. H. Watkinson spoke to the toast, "The American Society and Continental Societies of Heating and Ventilating Engineers." He paid a warm tribute to the progress made by these bodies of brother engineers, who, he said, did their work thoroughly and scientifically and were ever ready to emulate and acknowledge advances in practice made by other nations. He expressed the hope and confidence that the British society would maintain an equal footing with the other societies in the advance of the art.

New York School Building Criticised

A report of the condition of the public school buildings in New York City, covering both their construction and their mechanical equipment, made by Charles G. Armstrong, consulting engineer, to a committee on school inquiry of the Board of Estimate and Apportionment, is critical to a degree of the practice of the chief architect's and designing engineers' offices. Fifty-six school buildings were investigated. The report contains tabulated data regarding each school, accompanied by photographs illustrating the principal points brought out.

CONDITIONS FOUND IN PUBLIC SCHOOL BUILDINGS

1. Inefficient and inadequate mechanical design.
2. Unnecessarily high coal expenses and lack of proper records.
3. Antiquated and wasteful heating systems.
4. Poorly designed and improper ventilating systems.
5. Antiquated and unsanitary methods of cleaning.
6. Totally inadequate fire protection.
7. Lack of proper control over the operating forces.


N.Y. Board of Education
Committee on Buildings
Committee on Care of Buildings
Architectural Sup't of Schools
Personnel
Mechanical Sup't of Schools
Purchasing Agent
Supplies Inspection
Fuel Inspection By Bureau of Standards
Architectural Organization
Sanitary Engineering Expert
Electrical Engineering Expert
Heating & Ventilating Expert
Statistician
Superintendent of Operatives
Division Assistants
Mechanical Engineers for Inspection of Plumbing, Heating, Ventilating and Electrical Work
Drafting Forces
Operating Engineers & Assistants, Electricians Elevator Runners Firemen
Janitors Assistants Attendants Cleaners Laborers
Chart Showing Proposed Organization of a Mechanical Engineering Bureau for the New York City Public Schools
Chas G Armstrong & Son Consulting Engineers

PROPOSED PLAN FOR REORGANIZATION OF THE NEW YORK DEPARTMENT OF EDUCATION BUILDING BUREAU.

As a result of the investigation and report, the Board of Estimate has appropriated $10,000 as a demonstration fund to be used by Mr. Armstrong in testing his recommendations. It is proposed to equip two or three schools immediately with the necessary apparatus to try out the various plans mentioned in the report with special reference to fuel economy.

The conditions found in the school buildings are summarized by Mr. Armstrong as follows:

8. Unnecessarily high architectural expenses.
9. An inefficient and too numerous corps of inspectors and supervisors.
10. Financial losses due to improper letting of electrical contracts.
11. The present seating capacity of the schools is by no means utilized to its fullest extent.

Among the improvements recommended are:

IMPROVEMENTS RECOMMENDED

Wherever possible, consolidate and

centralize the now badly scattered boiler plants.

Provide means whereby a less expensive grade of coal may be used and better consumption assured; also provide proper system of making and keeping records.

Improve all heating systems so that the amount of steam generated may be used, while, at the same time, conserving and more fully utilizing the amount of coal burned.

Immediately provide adequate ventilation by installing proper air washing and conditioning apparatus.

Eliminate, as far as possible, disease germs and other filth by the use of modern vacuum cleaning systems.

Radically reorganize the designing, operating and purchasing departments.

Reduce the number and improve the personnel of the inspecting and supervising corps.

Reduce electric lighting expenses either by obtaining from the public service companies the same rate which is given to private consumers, or, failing in that, manufacture current on the premises.

Going at length into the condition of the heating systems, the report states that "the heating systems in general are poorly designed. Nearly all the schools have a mixture of various systems; some good and some poor, and, generally, all are of an antiquated pattern. The system most employed consists of separate return lines from each radiator to the basement, and is a wasteful and expensive method of installation. A good economical and modern vacuum system should be installed in all cases."

Commenting on the temperature control systems now employed, the report approves them and states that they should be extended to all school buildings heated by steam and to all sections of same.

With regard to ventilation, the report says: "Public opinion is at present greatly aroused on this subject. The widespread discussion and criticism of the method of ventilation now in vogue in the school buildings are timely and pertinent. The question is a vital one and the present systems of ventilation are, in most instances, so faulty and antiquated as to be a direct menace to pupils and teachers. Practically every known system of ventilation and heating may be found in the schools of New York, yet only in one building did we find modern methods in use."

The principal faults in this connection were found to be, according to the report, forcing dust-laden air into the class rooms, and the lack of proper humidifying apparatus.

"The continuation of these defects," adds Mr. Armstrong, "has created a condition which has justly aroused distrust in the minds of the teachers and called forth merited criticism from the general public."

The subject is described as so vast and important that it has been treated in a separate report by Mr. Armstrong which has not been made public at this writing.

Under cleaning, the report states that "while the school buildings in the main are fairly well cleaned, yet the present methods are antiquated and unhygienic. The modern sanitary vacuum cleaning process should be employed and the old-fashioned broom and duster relegated to the scrap heap."

POSSIBLE COAL SAVING

During the past year 105,000 tons of coal were burned, as follows:

Broken coal	73,335 tons
Egg coal	485 tons
Stove coal	1,260 tons
Pea coal	9,820 tons
No. 1 Buckwheat	20,000 tons

"Of this coal," says the report, "a large percentage can be changed to Buckwheat 3, effecting a saving practically equal to the difference in cost between that and the former quality of coal. This saving can be accomplished by the installation of a 'controlled draft' apparatus and by the alteration of grates to accommodate the finer size of coal. It is estimated that an annual saving in coal cost of about $295,000 will result from the adoption of the above recommendations. The cost of this apparatus complete would be in the approximate neighborhood of $2,500 or $3,000 per school building."

WOULD LIMIT ARCHITECT'S JURISDICTION

One remedy proposed in the report for improving the efficiency of the building department is separation of the duties devolving upon the architect and the designing engineers. "Architects," it is stated, "should have full charge of the design of buildings, but the mechanical features of the plants, viz., plumbing, heating, ventilating, etc., should be under the absolute control of an engineer of recognized ability and standing."

ESTIMATED SAVINGS

Taking up the estimated savings in detail the report gives the following as some of the more important that can be effected:

Changes in method and quality of coal burned and more efficient use of the steam thus generated, saving per annum over present methods	$350,000.00
Reorganization of inspection and designing section of engineering bureau	142,527.00

Saving in electrical costs, due to substitution of wholesale contract for retail contract. (A possible additional saving of $54,211.75 could be made by the use of high tension contracts, such as are being offered to private consumers.)	95,470.41
Saving due to use of modern lamps using 1¼ watts per candle instead of the present antiquated lamps using 2½ to 4 watts per candle, at least 50 per cent., after deducting motor current...	42,925.00
Total	$630,922.41

Although the report is intended to be a statement of conditions as found and of remedies proposed, without going into the question of the causes for the trouble, yet, as far as the operating engineers are concerned, Mr. Armstrong takes occasion to say that "very little fault can be found with the engineers and janitors when one considers the plants they are asked to operate. No meters, except here and there a water meter, no scales, no reports, and, above all, no competent instructors to teach them how to fire a boiler, how to get the most and best service out of their plants. The present method of issuing a 'book of rules' is not the proper method of procedure, as each plant differs from the others in character and method of operation. No rigid set of rules can ever take the place of kindly, intelligent and personal instruction."

An analysis made by Mr. Armstrong of the rates for electric current paid by the Department of Education makes the average rate over 6 cents per kilowatt. Mr. Armstrong's recommendations would mean a cutting of this price to not over 2 cents or, at the most, 3 cents per kilowatt.

Ventilation of the Pennsylvania Tunnel at New York City.

By B. W. Bennett, M. E.

At the time of the building of the new Pennsylvania Railroad terminal at New York City, the ventilation of the 15½ miles of tunnels leading from the station at Seventh Ave. and 33d St. under the Hudson River to Hackensack, N. J., and under the East River to Long Island City, and running the full width of Manhattan Island, under the city, was considered a matter of prime importance.

In the design of such a ventilating system, two main factors had to be considered. First, it was absolutely necessary that sufficient ventilation be supplied to make the tunnels safe under all emergency conditions; and second, it was highly desirable that such a standard of purity be maintained that passengers should suffer no discomfiture during times of normal operation, due allowance being made for occasional irregular spacing of trains.

DOUBLE INLET SIROCCO PRESSURE FAN, VENTILATING PENNSYLVANIA RAILROAD TUNNELS AT FIRST AVENUE AND 33D ST., NEW YORK.

In order to obtain these results, it was decided to maintain a standard of purity in the cars of not more than eight parts of carbon dioxide in 10,000 parts of air. This was equivalent to supplying 30 cu. ft. of air per minute to each passenger, and, in the case of the tunnels under the East River, was equal to approximately a 20-min. air change. To insure that the full amount of air desired to be supplied to the occupants of the cars, it was decided to deliver to the tunnels 50 cu. ft. of air per minute per person, or two-thirds more

DISCHARGE DUCTS ON DOUBLE INLET PRESSURE FAN (UNDER CONSTRUCTION), FIRST AVENUE AND 33D ST., NEW YORK.

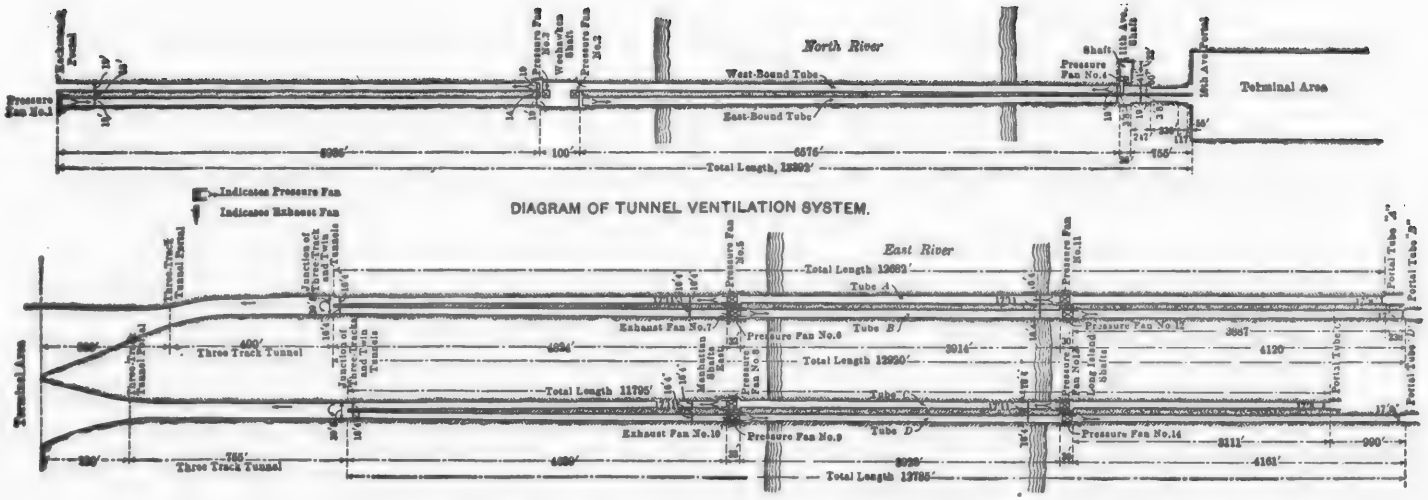


DIAGRAM OF TUNNEL VENTILATION SYSTEM.

TEST RESULTS—PENNSYLVANIA TUNNEL FANS.

Location.	Fan No.	Blower of Exhauster.	Direction of Air.	Diam. Wheel in inches.	Approximate Length of Tunnel Ventilated, in feet.	Fan Capacity at Normal Speed, in cubic feet per minute.	Velocity at Fan Outlet in feet per minute.	Brake Horse Power at Motor.
North River—								
Hackensack Portal. Building over portal	1	B	E	60	5900	87000	3920	48.6
Weehawken Shaft, in room between tracks below bench level	2	B	E	60	6600	125800	5670	97.0
	3	B	W	54	6000	100800	5580	56.8
Eleventh Ave. Shaft, in room at track level on north side of west-bound tube	4	B	W	60	6600	107000	4830	68.5
East River—	5	B	W	72	4800	100000	3130	62.0
First Ave. Shafts, in building located at ground level over tracks 3 and 4	6	B	E	54	3900	60000	3330	21.0
	7	E	E	66	4800	59200	4400	27.9
First Ave. Shafts, in building located at ground level over tracks 1 and 2	8	B	W	72	4800	100000	3130	62.0
	9	B	E	54	3900	60000	3330	21.0
	10	E	E	66	4800	59200	4400	27.9
Long Island City Shafts, in building located at ground level over tracks 3 and 4	11	B	W	54	3900	65000	3600	24.3
	12	B	E	54	4100	65000	3600	24.3
Long Island City Shafts, in building located at ground level over tracks 1 and 2	13	B	W	54	3900	65000	3600	24.3
	14	B	E	54	4200	65000	3600	24.3

than was actually required to maintain the desired standard of purity.

The system found to be the best adapted to local conditions was a forced draft system of the same kind as used for ventilating a number of railroad tunnels going through the mountains. In this system, the air is introduced in a stream of constant flow, through a divided nozzle which delivers it on each side of the tunnel through evase of expanding outlets, placed in the bench walls. In every case these outlets direct the flow of the air stream in the direction of traffic in the various tubes or tunnels. After the installation, it was found by test that a decided injector effect was obtained by the use of these special outlets. This effect was so pronounced in the case of the North tunnel under the

DOUBLE INLET SIROCCO EXHAUST FAN AT FIRST AVENUE AND 33D ST., NEW YORK.

Hudson River, that a strong current of air was induced, which flowed from the East entrance of the tunnel toward the fan, which is placed about 750 ft. from this entrance and blows toward the West end of the tunnel.

A further advantage obtained by the use of the system described above is the absence of obstructing duct work in the tunnels, thus leaving the side benches entirely free for walkways.

The accompanying photograph of these ducts, taken during erection, illustrates the great care given to this part of the installation.

A diagram of the tunnel lay-out and of the ventilating system is shown in Fig. 1. The upper diagram shows the lay-out of the system extending from Hackensack to the terminal area, and the lower diagram the lay-out of the system extending from the terminal area, Long Island City. The direction of the flow of the air from the various fans is indicated by arrows. In each case this is in the direction of traffic in the individual tunnels. The tunnels are so constructed that each tube is entirely separated from the others, thus preventing the by-passing of air between the tubes.

There are fourteen fans in all, twelve of which are used as supply fans. The other two fans, which are located at First Avenue, are exhausters and draw the air from the terminal area through the South tunnels under 33d and 34th Streets. These fans were so arranged in order to prevent the vitiated air from the North tunnels under these streets from being blown up into the station proper. The two accompanying photographs show a typical double inlet supply fan and one of the exhaust fans.

The fans used are Sirocco fans, and are particularly adapted to this work due to the relatively small space occupied by a fan for a given volume and due to their high efficiency. These fans have wheels of the multiblade, drum type. Some of the fans are double-inlet fans, while others are of the single-inlet type. The type used at each location is given in the table of test results below. The fans are all belted to induction motors and are equipped with three step cone pulleys, by which speeds of 70% and 40% of the maximum can be obtained.

After the installation was completed, tests of all the fans were made by the engineers of the Pennsylvania Tunnel and Terminal Company and of the American Blower Company. A tabulation of the results obtained is given below, together with a list of the location of the various fans.

Anemometer tests in the tunnels showed that the average air velocity due to the operation of the fans alone was about eight miles an hour, but this is increased to as high as thirty miles an hour due to the piston action of the trains.

Current Heating and Ventilating Literature.

Under this heading is published each month an index of the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the articles mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

HOT WATER HEATING

Hot-Water Heating for Institutions. Ira N. Evans. Discusses the proper way to design a system of this kind. Ills. 3500 w. Power—May 14, 1912. 20c.

BLOWERS

The Efficiency of Small Blowers. P. J. Haler and H. T. Wright. Gives brief descriptions of the Roots blower, a

Crowell blower, and a rotary positive blower. Ills. 700 w. Prac. Engr.—June 14, 1912. Serial. 1st part. 40c.

CAR HEATING

Alcohol Heater Car. Illustrated description of a car designated to furnish protection from freezing of perishable products. 800 w. Ry. Age Gaz.—June 7, 1912. 20c.

VENTILATION

The Influence of Ozone in Ventilation. Leonard Hill and Martin Flack. Investigations seem to show its principal function to be that of a deodorizer. 5000 w. Sci. Am. Sup.—June 1, 1912. 20c.

Ventilation of Restaurants. Charles L. Hubbard. Considers ventilation of the dining-room and kitchen. Ill. 1000 w. Dom. Engng.—June 1, 1912. 20c.

Cause of Failure in Warm Air Furnace Heating.

"In more than three-quarters of the cases of warm air furnace heating on which I have been called," states a Calgary, Can., heating engineer, "where complaints have been made, a handkerchief laid over the register pulled in instead of bulging out with the flow of warm air, showing conclusively that the furnace was hungry for air and naturally robbed the coldest rooms—the castings red hot, the cellar overheated and the rooms cold. Result: The owner condemns the furnace as no good. The first mechanic that comes in says that the house cannot be heated by warm air and plugs for a steam job. And why? Because the steam boiler manufacturers in order to get a market for their goods have been instructing the fitter, the plumber and the hardware man how to install the plant, having been given them the fundamentals for computing pipe sizes and the requirements of piping. Consequently the mechanic is on surer ground as to possible results in the case of steam. In the case of warm-air heating, how different! The manufacturer simply puts a furnace on the market, in some cases he will claim that it will heat a certain number of cubic feet, in other cases not. No attention whatever is paid either in instructions or otherwise concerning piping or method of setting. He, the manufacturer, has never before interested himself in the results, and the results have never interested themselves in the manufacturer or his goods further than to condemn them."

Efficiency Society.

A movement to develop the sciences of organization and management in ways that will lead to efficiency in the industrial and other fields has crystallized in the formation of the Efficiency Society, with headquarters in the Engineering Societies Building, 29 West 39th St., New York.

The task of organizing the society was begun in 1911 by a few men in New York. The movement grew by accretion through nominations by its members, and late in the fall an organizing committee of 130 men was gathered. The first meeting of the society as a whole was held in New York, March 18 and 19, 1912. At one of the sessions a letter expressive of confidence in the purpose of the society and extending best wishes for its success was read from President Taft. A symposium on organization was a prominent feature of the meeting.

Officers elected at that time included: President, James G. Cannon, Fourth National Bank, New York; First Vice-President, Henry R. Towne, Yale & Towne Mfg. Co., New York; Second Vice-President, Melville W. Mix, Dodge Mfg. Co., Mishwake, Ind.; Treasurer, Theo. Hetzler, Fifth Avenue Bank, New York; Secretary, H. F. J. Porter, 29 West 39th St., New York.

The society already has extensive plans on foot, including a canvass of the causes of inefficiency existing in each of a number of enterprises and notes of the results of the efforts which have been made to correct it. It is planned to use these data in an effort to harmonize and standardize established college courses in commercial and business administration, as well as to make them available for the use of employers and those engaged in reorganizing and systematizing work in offices and factories.

The fees for active members, who are those who have been for five years in responsible charge of enterprises or who belong to one of the learned professions, are $25 initiation and $15 annual dues. Associates members, who are described as "all others," pay $10 initiation fee and $5 annual dues.

Burnham Boilers is a recent catalogue, of unusually unique design, published by Lord & Burnham Co., Irvington, N. Y. It is devoted to the Burnham cast-iron boilers, both square and round. Colors and arrowed lines are used, for instance, with good effect, in showing the extra long fire travel in the Burnham square sectional boilers. Attention is also called to the new 24-in. square sectional series, which have just been placed on the market, replacing the company's 24-in. present series. The new series, although built along the same lines as the present series, has many improvements, it is stated, over the older type. Interesting sections of the catalogue are those devoted to "The Truth About Boilers," and "Rating Notice and Chimney Facts." Size 4x10 in. Pp. 48.

Legal Decisions

Damages for Breach of Contract—Offer to Make Repairs.

The owner of a house employed the defendant to install a hot water heating plant in his dwelling and paid him therefor, upon the defendant's assurance that the work would prove satisfactory, and that, if it did not, he would make it so. The work did not prove satisfactory, and the owner had it overhauled at an alleged expense of $687.67, for which he sued the contractor. The jury found for the plaintiff $604.87. On appeal, the only defense insisted upon was that, as the defendant offered to make the necessary changes for $175 and to give bond for the satisfactory performance of the work, that sum fixed the measure of the plaintiff's damage. The court did not assent to that view. The questions for the jury were: Was the plaintiff damaged? And if so, how much? The defendant's estimate of the sum necessary to bring about a compliance with his contract was not conclusive, nor did his offer to give bond to do the work for the sum so fixed by him bind the plaintiff to intrust the repairs to him. The jury found that the defendant had failed to perform his contract. The plaintiff had a right to have the work done in accordance with the contract, and charge the defendant with what the repairs were reasonably worth in the market. Judgment for the plaintiff was affirmed.—Dornblatt v. Carlton, Georgia Court of Appeals, 73 S. E. 1085.

Substantial Compliance With Contract.

In the action for the balance of the contract price for installing a heating plant in a building owned by the defendants, the latter claimed that there was not a substantial compliance with the contract, and counterclaimed for the amount paid by them on account. Decree was rendered for the defendants on their counterclaim. The written contract contained special warranties. On appeal it was held that a substantial compliance with these was a condition precedent to recovery by the contractor. The evidence was in irreconcilable conflict, and the Supreme Court was unable to say that the trial court's finding was against the preponderance. It was, therefore, its duty to affirm the decree. The plaintiff unsuccessfully contended that there was a decided preponderance of the testimony of witnesses for the plaintiff showing an accurate knowledge of that kind of work, and that the testimony of many of the defendants' witnesses should be disregarded on account of obvious lack of such knowledge. The heating apparatus was still the property of the plaintiff who was entitled to remove it from the premises as far as that could be done without injury to the building.—Campbell v. Kennerly & Doer, Arkansas Supreme Court, 143 S. W. 97.

Advantages of the 1912 U. S. Standard Schedule for Standard and Extra Heavy Flanged Fittings and Flanges.

In a statement sent out by the American Society of Mechanical Engineers, emphasis is laid on the fact that the new "1912 U. S. Standard" for standard weight and extra heavy flanged fittings and flanges refers particularly to heavy work and to sizes above 9 ins., so that these changes will affect principally the large consumers of great responsibility where safety is essential and where no expense is considered too great which will prevent accident and secure continuity of service.

The new standard brings up materially the factor of safety in the bolts, flanges and fittings, made necessary in view of the enormous strains encountered due to changes of temperature. The other important feature in the "1912 U. S. Standard" is the uniformity of dimensions providing for interchangeability of fittings.

In comparing the "1912 U. S. Standard" with the alternative standard submitted by the sub-committee of manufacturers with respect to diameter of bolt circle, number of bolts and diameter of bolt holes, we find, the statement continues, that they are identical, with the one exception that the U. S. Standard gives ⅞-in. instead of ¾-in. for diameter of bolt hole for 4-in. pipe.

For extra heavy flanges up to 9 in. inclusive, the "1912 U. S. Standard" and the standard of most manufacturers are identical. Above 9 in. the U. S. Standard is somewhat larger than the present standards.

This standard, concludes the statement, has been in operation two months and has already been approved and adopted by the U. S. Navy Department, U. S. Bureau of Standards, Isthmian Canal Commission and is under consideration by other departments of the U. S. Government. Large power concerns such as the Interboro Rapid Transit Company of New York, the New York Edison Company and others who in the past have had fittings made from their own patterns, because there was no standard, have agreed to adopt and use the "1912 U. S. Standard." Mr. L. B. Stillwell, electrical engineer of New York, has specified the "1912 U. S. Standard for fittings in the new 120,000 KW. power house now in process of construction at Hauto, Pa., by the Lehigh Navigation Electric Company.

The committee of The American Society of Mechanical Engineers has decided after the most careful consideration not to reopen the subject, as has been erroneously reported.

The statement advises that copies of the "1912 U. S. Standard" schedule may be obtained from The American Society of Mechanical Engineers or from the master fitters' association.

Government Hearing on Flanges.

The Navy Department, Bureau of Yards and Docks, at Washington, D. C., held a hearing June 17, for the purpose of giving certain manufacturers an opportunity to give reasons why they do not recommend the use of the "1912 U. S. Standard" Schedule on Government work. The concensus of opinion at the hearing was in favor of the "1912 U. S. Standard."

The government had representatives present from the Army, Navy, Auditing, Purchasing Departments, Bureau of Yards and Docks, Bureau of Standards. The manufacturers represented were the Crane Company, Walworth Mfg. Co., McNab & Harlin Mfg. Co., Best Mfg. Co., Kelly & Jones. The societies responsible for the "1912 U. S. Standard" were represented by Henry G. Stott, member of the council of The American Society of Mechanical Engineers, Henry B. Gombers, secretary of the National Association of Master Steam and Hot Water Fitters. Carl L. Carlson, Corps of Civil Engineers of the U. S. Navy, presided.

The chief objection made by the manufacturers, whose spokesmen were, A. M. Hauser, of the Crane Co., and Mr. Evans of the Best Mfg. Co., was the enormous cost to them. It developed, however, from the testimony of one of the manufacturers present, that the cost of the new standard would be less than anticipated, because the manufacturers had already been through the experience once within the past two years and found that they were not obliged to use iron patterns or special tools in their work, but did all their facing on lathes and facing machines.

It was found that it would be possible to supply material according to the new standard within two years and that the standard could thus become universal by that time.

"Manufacturers 1912 Flange Schedule" Adopted.

Notice has been received from the Committee of Manufacturers on Standardization of Fittings and Valves that at a meeting held at the committee's headquarters, 30 Church St., New York, on July 10, 1912, the "Manufacturers 1912 Schedule" of Flanged Fittings and Flanges was adopted by that body, to take effect October 1, 1912. This schedule differs materially from the "1912 U. S. Standard" schedule which has been adopted by the mechanical engineers' society and by the National Association of Master Steam and Hot Water Fitters, as well as by The American Society of Heating and Ventilating Engineers.

"There was practically no opposition," continues the notice, "among the manufacturers present to the adoption of this schedule, but one vote being recorded against it. Copies of this schedule will be printed and distributed to the manufacturers and the trade generally as soon as possible.

"New list prices for brass and iron body swing check valves, standard and extra heavy, were also adopted at this meeting, to take effect October 1, 1912, copies of which will be printed and distributed to the trade as promptly as possible."

The list of members, which was sent out with the notice, and appeared in full in THE HEATING AND VENTILATING MAGAZINE for June, 1912, contains the additional name of the Wm. Powell Co., Cincinnati, O. Those omitted are the Direct Separator Co. Syracuse, N. Y., and H. J. Kaltenthaler, Philadelphia.

National District Heating Association.

A feature of the recent meeting of the National District Heating Association in Detroit was the presentation of a gold watch chain and diamond-studded fob from his many friends present to D. L. Gaskill, secretary-treasurer of the association. The chain was of rope pattern and the fob bore the monogram of the association, in addition to the initials of Mr. Gaskill. The presentation speech was made during the closing session of the meeting by A. C. Rogers, of Toledo, who expressed the general sentiment when he spoke of the esteem felt by the members for Mr. Gaskill and of their appreciation of his efforts in the upbuilding of the association. Mr. Gaskill found words to express his astonishment and pleasure at the kindness of his friends and pledged anew his devotion to the association's interests.

The ladies present at the Detroit meeting of the National District Heating Association were:

Mrs. A. E. Bettis, Kansas City, Mo.
Mrs. A. D. Spencer, Detroit.
Mrs. R. W. Symes, Detroit.
Mrs. A. P. Biggs, Detroit.
Mrs. J. H. Wilson, Grand Rapids, Mich.
Mrs. J. F. Lewis, Detroit.
Mrs. Alex. Dow, Detroit.
Mrs. George D. Higgins, Detroit.
Miss O'Mara, Detroit.
Miss Francois, Detroit.
Mrs. H. R. Wetherell, Peoria, Ill.
Mrs. J. H. Meyer, Detroit.
Miss Jeannette A. Meyer, Detroit.
Miss Martina Meyer, Detroit.
Mrs. A. C. Rogers, Toledo, O.
Mrs. W. C. Bryant, Detroit.
Mrs. W. L. Klingelhofer, Pittsburg, Pa.
Mrs. J. D. Hiles, Pittsburg, Pa.
Mrs. C. A. Seckell, Detroit.
Mrs. L. M. Jacques, Detroit.
Mrs. W. M. Moore, Detroit.
Mrs. J. Trombley, Detroit.
Mrs. J. G. Ivers, Detroit.
Mrs. H. B. Kellogg, Detroit.
Mrs. J. W. McNamara, Detroit.
Mrs. E. H. Negley, Canton, Ill.
Mrs. H. O. Herrick, Detroit.
Mrs. Charles Keplinger, Toledo, O.
Mrs. F. H. Horning, Elmira, N. Y.

Mrs. Wilkinson, Elmira, N. Y.
Mrs. G. D. Bly, Toronto, Can.
Miss Gladys Bly, Toronto, Can.
Mrs. A. E. Ingersoll, Detroit.
Miss E. M. Gibson, Detroit.
Mrs. M. L. Martin, Detroit.
Miss Helen Martin, Detroit.
Miss F. Flusky, Detroit.

A New Condenser Trap.

One of the new products of the Morehead Mfg. Co., Detroit, Mich., is a condenser trap, for use on low pressure and exhaust steam heating lines. This device is, in general appearance, similar to the old and well-known Morehead return steam trap. In detail, however, the condenser trap differs from the return trap in the addition of a cold water connection, made through a flexible tube with the tank of the trap. The flexible connection terminates in a perforated pipe inside of and running the length of the trap tank. In short, the condenser trap is a combination of the principles of the jet condenser and of the Morehead automatic return steam trap.

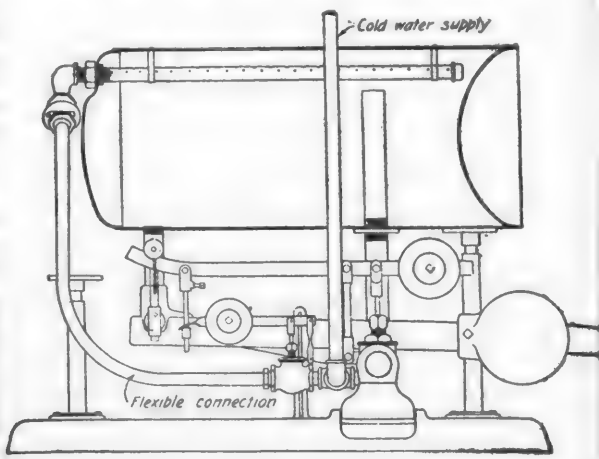
In a recent article on "Economic Efficiency of Steam Mill Plants," James M. Taggart, M. E., says: "One reason that leads to the use of high pressure steam in heating and drying apparatus is the fact

INSTALLATION OF MOREHEAD CONDENSER TRAP IN PLANT OF SAUER MOTOR CO., PLAINFIELD, N. J.

that a positive pressure is often needed to remove the condensation. That is, to render the apparatus effective the condensation must be removed as fast as it collects. High pressure is, however, not necessary to accomplish this. It can be accomplished more easily by means of a condenser trap in which a vacuum is formed by a cold water spray. In practice vacuums ranging from 5 to 12 lbs. per square inch are obtained. In some cases vacuum pumps have been used for this purpose. However, for handling hot water, traps are most efficient and reliable."

DESCRIPTION OF THE TRAP.

The condenser trap is held to dispense with the use of vacuum valves and pumps continuously used on such systems, and, it is claimed, may be installed at less cost. Connected to the return line of vacuum heating systems where a difference of pressure is maintained between the ends of the system the line condensation and accumulating air is taken into the tank of the condenser trap as in the case of the return trap, but with the added pulling



CROSS-SECTIONAL VIEW OF NEW MOREHEAD CONDENSER TRAP.

power of the vacuum created in the tank of the condenser trap.

When the steam is turned on in the heating system, the various lines of which are full of air, the cold water supply valve, as shown in the sectional view of the trap, is opened slightly. As the condensation from the return lines and the condensing water fills the tank the latter tilts, opening the live steam valve, allowing the steam pressure to enter and discharge the water contents into a return steam trap above the boiler or into an open heater.

As soon as the water is discharged, the tank, containing the steam which is left after the water is discharged, resumes a horizontal or filling position. The tank returning to its horizontal position automatically opens the control valve on the cold water inlet and allows the cold water spray to come in contact with the live steam contained in the tank. This cold water condenses the steam and forms a vacuum in the tank of the trap which, in turn, performs the usual functions of created vacuum in heating systems, of pulling the condensation from the lines to be drained.

WATER CONSUMPTION SMALL.

The cold water supply is furnished either from city water works or a tank or other

source that is available for that purpose. Particular attention is called to the fact that a surprisingly small amount of water is required in the condensing process.

A receiver is always used in connection with the condenser trap, the water seal in the receiver taking the place of the thermostatic valves on the heating system. The condenser trap is used as the lower trap, taking the place of the return trap in the Morehead standard double trap installation, the lower or condenser trap discharging to the return trap placed above the boiler.

Exhibit of Wyckoff Steam Pipe Covering.

In our description of the exhibits at the recent convention of the National Association of Master Steam and Hot Water Fitters, at Atlantic City, it was stated that the A. Wyckoff & Son Co., Elmira, N. Y., had on view a sample of its wood stave casing, made out of white pine and having a thickness of shell of 2 in. This was an error, as the company's exhibit consisted of a section of its new gulf cypress improved steam casing with a 3¼-in. shell. This new casing is a great improvement over the company's old style of covering. It is made of cypress, "the wood eternal." The inner shell of the casing is 2 in. thick and the dead air space between the layers has been increased 50 per cent. The company states that these improvements have more than doubled the life of the casing.

Trade Literature.

Radiation for July, 1912, the periodical published by the United States Radiator Corporation, Detroit, Mich., contains a system of heating and plumbing symbols used by the Minneapolis Architectural Club. This issue also contains the third installment of W. B. Northrup's serial, "From Mine to Consumer," being a story of the iron industry; further hints on heating buildings with steam, by Roufis St. John; "The Rise of the Master Fitter," by Edward Mott Woolley; "Baking Out of Doors," by E. I. Farrington, and the continuation of Mr. Kellum's articles on scientific management and of James F. Cosgrove's series on "Fuel and Draft."

Ideal Heating Journal for July, 1912, the monthly periodical of the American Radiator Co., Chicago, has as its cover picture a view of City Hall Park, New York, showing the new 28-story Municipal Building, which is to be heated with American radiators. The leading article describes a visit to the Institute of Thermal Research, which the company maintains at its Buffalo plant, written by Frank L. Busey. A typical interior view in the institute shows the weighing room for weighing water of condensation from the radiator-testing rooms above. "A Regitherm Test" is described and illustrated by chart, showing the remarkably even temperature obtained by the use of this device, which is designed to automatically control the temperature by regulating the dampers on a hot-water-heating system. The remainder of the issue contains many other interesting items and notes.

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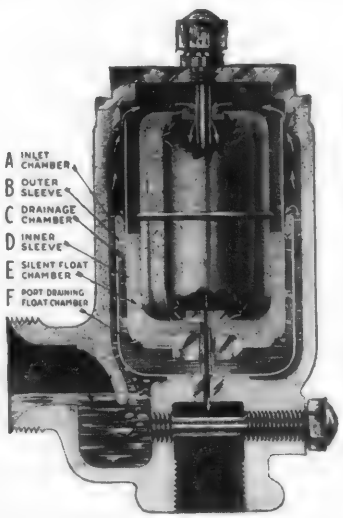

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TRADE AND MISCELLANEOUS NOTES

Coming Events.

September 2-7, 1912—Sixth congress of the International Association for Testing Materials, New York. Headquarters at the Engineering Societies Building.

September 24-26, 1912—Fourteenth annual conference of the American Hospital Association, Detroit, Mich.

Deaths.

Frank W. Foster, president of the F. W. Foster Mfg. Co., Boston, Mass., manufacturer of heating specialties, died at his home in Melrose July 7. He was 50 years old. Mr. Foster was the inventor of a number of heating devices.

Fred Adee, founder of the Fred Adee Co., New York, dealer in heating and plumbing supplies, died at his home in New York June 30. He was 83 years old and had retired from business.

Albert T. Leach, treasurer of Domestic Engineering, Chicago, and secretary and treasurer of the Kenfield-Leach Co., was killed in an automobile accident July 4 near Valparaiso, Ind. He was 36 years old.

Miscellaneous Notes.

Springfield, Ill.—The local Board of Education has included in its budget an item of $10,000 for installing a new heating system in the high school building. The plant will be made sufficiently large to supply the addition to the building which is under contemplation.

Grand Rapids, Mich.—Grand Rapids contractors have been invited to bid on the proposed new heating plant for Olivet College. The work is estimated to cost around $50,000.

Atlanta, Ga.—A $20,000 heating plant is proposed for the new buildings of the Georgia School of Technology. A bill has been introduced in the State Legislature authorizing Gov. Brown to pay a warrant in favor of the school trustees to the amount of $10,000 for the erection of a heating and power plant, provided a similar sum is raised by outside parties.

Shamokin, Pa.—A proposition to build a new central heating plant for the orphanage buildings of the Independent Order of Odd Fellows, near Sunbury, was favorably acted upon at the recent annual meeting of the board of representatives and directors, July 8 and 9. A brick power house will be built, 30x40 ft., one story high, and equipped with the necessary apparatus to heat the entire group of buildings, including the new school house now in course of erection and the newly built main building.

Meadville, Pa.—A new heating plant is planned for Allegheny College, at Meadville. It is proposed to replace the present equipment of two 60 H. P. boilers with two 180 H. P. boilers and to build a new brick smokestack of sufficient height to take care of the increased boiler capacity.

Houston, Tex.—Plans have been drawn for a heating and cooling plant for the City Auditorium at Houston, to cost in the neighborhood of $35,000. Frank L. Dormant is city engineer.

Anderson, Ind.—A petition was presented to the Board of Public Works asking that the Central Heating Company change its plans for the location of its new steam heating plant in the path of East Eighth Street. It is claimed that the present location of the plant

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will prevent the city from ever building a bridge to Park Place from the Eighth Street side. The foundations of the plant are already laid and the company claims that the condemnation of half of its lot, as proposed, would prevent the building of its plant on this site. The land was purchased last March and it was known at that time that the company intended to locate its plant at that point.

Victor, Colo.—A franchise has been reported favorably to the Victor Council, giving a heating company which has been organized at that place the right to use the streets and alleys of the town in connection with a central station system of steam heating. The company is being financed by Denver capital. Heat will be supplied at first only to the business district, but the plant will be laid out to permit of additions.

Rushville, Ind.—The County Council has appropriated $4,500 for a heating plant for the courthouse.

Cleveland, O.—The City Council's Committee on Streets has approved the proposed ordinance granting the Cleveland Illuminating Company franchise rights for additional steam heating pipes in the downtown district. A committee of the stationary engineers objected to the proposed ordinance on the ground that it would throw engineers out of work.

Cleveland, O.—If the new municipal heating plant to be established by the city at the Fairmount pumping station is found to be successful, Constructing Engineer Ballard of the Municipal Lighting Department advocates the establishment of a $1,000,000 municipal heating plant in the central section of the city. Before contracts are let for the Fairmount plant it will be necessary for the city to reach some final agreement with the trustees of the Art Museum, since the primary purpose of the plant is to heat the proposed Art Museum in Wade Park. Owners of nearby apartment houses have already agreed to take the city heating service. The lines will be carried, in some cases, over a mile from the plant.

It is definitely announced that there will be no heating service from the proposed new $2,000,000 municipal light and power plant, which is a separate proposition.

New York—A special committee of the New York Board of Education to investigate ventilation of school buildings has made a report in which it states that it agrees with Prof. C. E. A. Winslow in his statement that there is only one principle of ventilation in which the authorities are unanimous, namely, that a high temperature is detrimental to mental vigor and health. The report recommends that much discretion be allowed principals and teachers in the matter of using the windows as means of ventilation. It was recommended that schoolroom temperatures be kept at 60 to 68 deg. F. and that the windows be opened at intervals. A further investigation is advocated.

United Bunch of Sheep, New York Fold, enjoyed a day of outing July 27, with a shore dinner at Boehm's picnic grounds, New Dorp, Staten Island.

Eastern Supply Association and Central Supply Association held separate and joint sessions at Atlantic City July 10. Both associations were well represented. The sessions were held at the Hotel Dennis. President P. M. Beecher presided at the meeting of the Eastern Supply Association. Among those elected to membership at this meeting were the Hart & Crouse Co., Utica, N. Y.; George I. Roberts & Bros., New York. The report of the credit bureau showed that of 258 claims placed in the hands of Secretary Frank S. Hanley, amount-

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ing to over $19,000, payments had been made to the amount of $13,000. The association endorsed the pending legislation at Washington for one-cent letter postage. The Central Supply Association at its meeting was presided over by President William Ivy. At this meeting it was voted that members of the association decline to furnish fictitious invoices for supplies sold, especially in such cases where customers have taken contracts on a percentage basis, and to furnish only regular bills or invoices applying to such purchases.

The joint session in the afternoon was opened by P. M. Beecher, and William Ivy was then made permanent chairman and Secretary Paul Blatchford, of the Central Supply Association, permanent secretary. Among the speakers at this meeting were Charles M. Pepper, of the State Department at Washington, who referred to the export trade opportunities, especially in connection with the opening of the Panama Canal, and C. V. Kellogg, who offered a method of preventing errors in making estimates for material.

Youngstown, O.—In connection with the ventilation of the County Court House at Youngstown, the County Commissioners are considering a plan to use the system for ventilating the courtrooms only. This action is taken as the result of recent tests which appeared to demonstrate that the plant was inadequate to ventilate the entire building.

Marshalltown, Ia.—W. T. Bailey, of the Marshalltown Syrup and Sugar Co., has acquired the property of the Peterson Heat, Light & Water Co., including the power house, with its contents and all piping, which was formerly used in connection with a system of central station heating. A heavy debt has long hung over the property. Arrangements, it is said, are being made to operate the plant the coming season.

Ventilation certificates, to be issued when the ventilation of a building is found to be satisfactory, are proposed by a writer in the *American Artisan.* the inspectors issuing such certificates to be men of long experience in the ventilating line. The idea is advocated especially in such cities as have bureaus of ventilation.

University of Illinois, Urbana-Champaign, Ill., announces the establishment of a graduate course in engineering. Among the subjects included at present are architecture, engineering mechanics, hydraulics and sanitary engineering, steam engineering, electrical engineering, heating and ventilating engineering, railway engineering, masonry and structural engineering, and mining engineering.

Graduates of the usual four years' course in engineering who have the degree of bachelor of science or its equivalent may proceed with work along one or more of these lines to the master's degree, which may be obtained after one year of graduate work, or to the doctor's degree, which may be obtained in two years after the master's degree. Detailed information regarding these courses may be obtained by addressing the Dean of the Graduate School, University of Illinois, Urbana, Ill.

Lectures on the Smoke Problem have been prepared by the members of the staff of the Department of Industrial Research of the University of Pitts-

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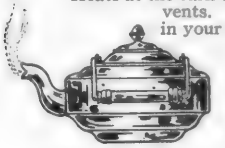

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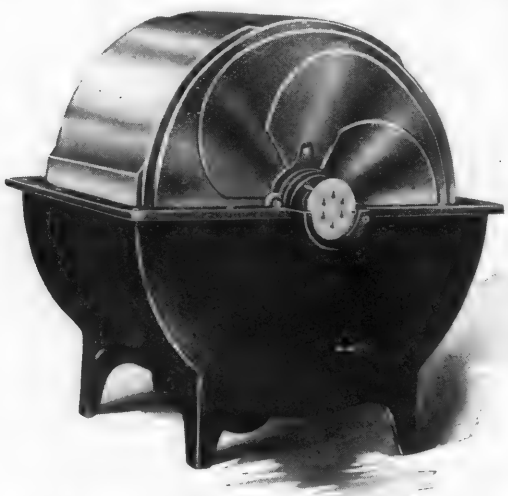
burg. These lectures are the result of an extensive investigation of the smoke problem which was conducted during the past year by the department through the generosity of a Pittsburg business man. The various phases of the subject to which particular attention was devoted are shown in the list of lectures which treat of "The Smoke Nuisance," "Smoke and the Public Health," "Smoke and the Cost of Living," "Smoke and Plant Life," "Methods and Means of Smoke Abatement," "The Effect of Smoke on Buildings and Building Materials," "The Psychology of Smoke," "The Smoke Nuisance and the Housekeeper." Particulars regarding the giving of these lectures may be obtained from Dr. R. C. Benner, of the University's Department of Industrial Research, Pittsburg, Pa.

James Knox Taylor, until recently supervising architect for the United States Treasury Department at Washington, D. C., has been offered the post of professor in the Department of Architecture at the Massachusetts Institute of Technology in Boston. Mr. Taylor has been succeeded as supervising architect of the Treasury Department by Oscar Wenderoth, of the firm of Carrere & Hastings, New York. Mr. Wenderoth was associated with Elliott Woods, superintendent of the Capitol, in the construction of the Senate and House office buildings, and has been connected with the supervising architect's office for the past six years.

American Federation of Labor, acting through its executive committee, has voted to accept no per capita tax after May 1, 1912, from the International Association of Steam, Hot Water and Power Pipe Fitters and Helpers of America. This action, it is anticipated, will bring to a crisis the attempt of the American Federation of Labor to have the journeymen steamfitters disband their organization and unite with the United Association of Journeymen Plumbers. A movement is on foot involving the revocation of the charter of the journeymen steam and hot water fitters' organization, and the matter will be up for decision at the forthcoming annual convention of the American Federation of Labor in Atlanta, Ga., next November. Meanwhile a letter written by the United Board of Business Agents of the Building Trades of Manhattan and vicinity, endorsed by the board of governors of the five borough boards, written in reply to a notification of the American Federation's plans for "one organization in the pipe fitting craft," states that the two local unions of the journeymen steamfitters' association "are now and always have been affiliated with the central body of the building trades in this city (New York), and



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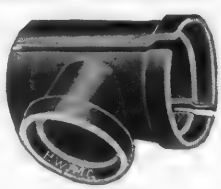

With steam pipes installed in J-M Sectional Conduit, loss of steam by condensation is prevented. This conduit carries steam through thousands of feet of piping with practically no loss. It saves over 90% of heat lost in transmission through poorly insulated pipes.

Is unequalled for conveying steam, gas, water, brine or other liquids underground.

Acids, gases, and the chemical action of the earth, do not affect it. Can be taken up and relaid without injury. Is practically indestructible.

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1475

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this body recognizes their right as union men to do steamfitting work in all its branches, and we do not propose to recognize any other organization in the steamfitting industry."

Des Moines, Ia.—A company is being organized in Des Moines to construct and operate a central heating plant for the city. Mayor James R. Hanna has been notified that a proposed franchise is being prepared permitting the laying of heating mains in the city's streets. The organizers of the company are getting the proposition in shape for presentation to the voters in November, as action of this sort is necessary in Des Moines.

Manufacturers' Notes.

Isaac A. Sheppard & Co., Philadelphia, Pa., have removed to their new plant at Erie Avenue and Supviva Street, Philadelphia.

Philip Carey Mfg. Co., Cincinnati, O., manufacturer of pipe insulating materials, has increased its preferred stock from $1,000,000 to $2,000,000. The additional capital is to be used in extending the facilities and capacity of its plant.

Minneapolis Heat Regulator Co., Minneapolis, Minn., has practically completed its new office and factory building at Fourth Avenue and 28th Street, Minneapolis. This company, which recently changed its name from the Electric Heat Regulator Co., has increased its capital stock from $40,000 to $200,000. All of the manufacturing equipment in the new building is to be driven by direct-connected motors. An increase of 50 per cent. in the company's business so far this year is reported over the corresponding period last year. The executive staff is composed of: President and treasurer, William R. Sweatt, secretary and sales manager, W. H. Wilson; assistant treasurer, S. S. Stimson; superintendent, J. S. Kersteter.

American Thermostat Co., Elmira, N. Y., has moved into its new office and factory building, which it recently completed.

United Foundry & Machine Co., Bridgeport, Conn., has taken temporary quarters for the manufacture of its line of brass, bronze and aluminum castings. The officers of the company are: President, William C. Buckelew; treasurer, Andrew Steen, New York; secretary, Philip D. Beach. Others interested, as directors, are George A. Helme, New York, and F. L. Buckelew, Jamesburg, N. J.

Chattanooga, Tenn.—James F. Digan,

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of Logansport, Ind., has advised Dr. H. M. Evans, secretary of the Chattanooga Chamber of Commerce, that the details are practically completed for the erection of a large radiator manufacturing plant at Chattanooga.

American Radiator Co., Chicago, has purchased ten Abbott-Detroit runabout automobiles for the use of its salesmen. If these prove satisfactory in service, it is proposed to increase the number of cars until a large part of the company's business from coast to coast is transacted by automobile.

Consolidated Engineering Co., Chicago, manufacturer of the Van Auken system of vacuum steam heating, announces that William J. Price, founder of the Fargo (N. D.) Plumbing and Heating Co., who recently sold his interests in that company, has secured the entire holdings of Thomas J. Leonard in the Consolidated Engineering Co. B. E. Van Auken succeeds Mr. Leonard as president and Mr. Price has been elected vice-president and treasurer. E. B. Gordon, Jr., remains secretary of the company.

Canadian Morehead Mfg. Co., Ltd., with headquarters at Woodstock, Ont., is a new organization of the Canadian business of the Morehead Mfg. Co., of Detroit, Mich., manufacturers of the Morehead system of steam line drainage and boiler feeding. The move is a direct result of the rapid growth of the company's business in the past few years. The new concern is incorporated under the laws of Ontario, with the following officers: President, A. Fitzgerald; vice-president, D. E. Scott; secretary, treasurer and general manager, George H. King. The Morehead line of non-return, return, vacuum and condenser steam traps will be manufactured under the direct supervision of George W. Cole, who has represented the Morehead Mfg. Co. for the past nine years and is regarded as one of the oldest in experience and one of the best posted steam trap and drainage men in the trade.

Haydenville Co., Haydenville, Mass., announces that it has acquired control of the Bay State Brass Co., of Haydenville and New York. The Haydenville Company will continue the plant under separate management. The company manufactures brass and iron goods for water, steam and gas.

Ohio Blower Co., Cleveland, O., has moved into its new works at 5125 Perkins Avenue, Cleveland, where practically triple the manufacturing space is available in the company's new three-story building. The company makes cast-iron exhaust heads, steam and oil separators and rotary ball-bearing ventilators.

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are inexpensive to install and economical to operate.

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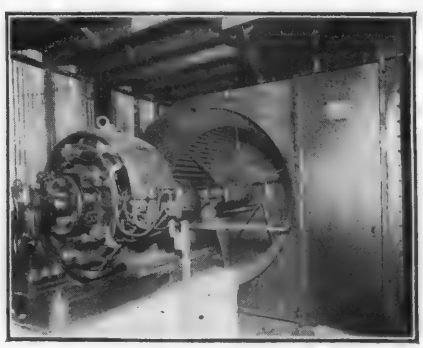
"Sirocco" Fans handle enormous volumes of air for their small size and full housed fans are generllay used—hence small foundations at small cost.



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CANADIAN SIROCCO COMPANY, Limited
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American District Steam Co., North Tonawanda, N. Y., announces the organization of a general engineering department, under the management of Byron T. Gifford, formerly associated with the Central Station Engineering Co., Chicago. The company has removed its Chicago offices from the Monadnock Block to the ninth floor of the First National Bank Building, which will be the headquarters of the new department. The company is now prepared to figure on installations of power, lighting and railway plants, also water works, etc. Other changes announced by the American District Steam Company are as follows: Charles A. Gillham, formerly connected with the Central Station Engineering Co., Chicago, has become associated with the company's contracting department, and James A. Bendure, formerly connected with the Economy Light, Fuel and Power Co., Lackport, N. Y., has also become associated with the company's contracting department; also Arthur E. Duram, formerly connected with the Central Station Engineering Co., Chicago, has joined the company's engineering staff.

Central Station Steam Co., Detroit, Mich., reports an order from the Home Heating Co., Erie, Pa., for material for 2,500 ft. of 10-in. pipe construction and 1,800 ft. of 14-in. construction. The company also reports a recent sale of 42 expansion joints to the Milwaukee Electric Railway & Light Co., Milwaukee, Wis., making a total of 924 expansion joints purchased to date by this plant.

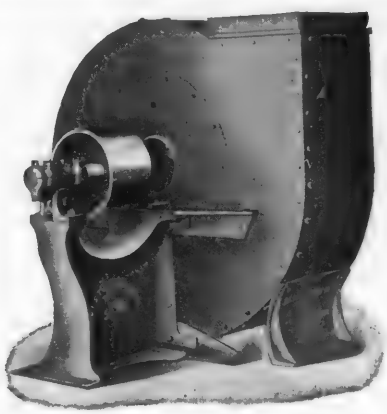
Frank Patterson & Co., New York, report steadily increasing demands for their hot-water heaters. Types of these heaters are in process of construction for the Hotel Baltimore, Kansas City, Mo.; University of Pennsylvania, Philadelphia; Springfield State Hospital for the Insane, Sykesville, Md.; Dempsey Hotel, Macon, Ga.; Mercersburg Academy, Mercersburg, Pa.; Agricultural and Mechanical College, College Station, Tex.; Hyde Building, New York, and the University of Rochester, Rochester, N. Y.

New Firms and Business Changes.

E. W. Tyler, Cleveland, O., formerly actively engaged in the heating and ventilating business in Cleveland, has reopened an office at 4143 East 123d Street, that city.

Nevada Plumbing & Heating Co., Nevada, Ia., is the new name of R. S. Patrick & Co., which was purchased by H. E. Whitstone, E. A. Chapman and Nate Chapman.

Concealed Transom Lift Co., New York, is the title of a new concern which will market the Richmond concealed



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transom lift, heretofore manufactured and sold by the McCrum-Howell Co., New York. The officers of the new company are: President, Ernest E. Bell; treasurer, Charles W. Yates; secretary, William M. Beard.

Western Heat Regulation Co., which has recently succeeded the Western Heating Co., is located in San Francisco, Cal., and not in Chicago, as announced in a recent issue. The company has quarters in the Monadnock Building, San Francisco, where it will act as manufacturers' agents and engineers for heating, ventilating, humidifying, cooling, etc. President, F. H. Bryant; secretary, L. F. Halloran.

Earle C. Powers, Boston, Mass., has opened an office as a heating and ventilating engineer at 143 Federal St., Boston, Room 47.

New Incorporations.

Kisthardt Plumbing & Heating Co., Cleveland, O., capital, $10,000. Incorporators, M. R. Godfried, M. Marquard, F. P. Shumaker, D. P. Mills and M. W. Spear.

Milwaukee Heat Generator Co., Milwaukee, Wis., capital $25,000. Incorporators: George Linder, Herbert R. Schumann and Hubert J. Rock.

East End Plumbing & Heating Co., Grand Rapids, Mich. Incorporators: A. F. Vollette, Charles Lang and O. E. Munn.

National Steam Heating Co., Dayton, O., capital $50,000, to manufacture steam heating boilers. Incorporators: James Sanders, Earl F. Deal, Joseph Meyer, Edward L. McCleary and Edward C. Baver.

Hart Mfg. Co., Grand Rapids, Mich., capital $12,000, to engage in heating contracting work. President, C. L. Kellogg; vice-president, E. C. Rossier; secretary-treasurer, L. H. DeGuere.

Dayton & Montgomery, Brooklyn, N. Y., capital $10,000, to conduct a heating and plumbing contracting business. Incorporators: Ralph E. Dayton, Mabel B. Dayton and Harry M. Clark.

Acme Plumbing Co., Richmond, Va., capital $25,000. Incorporators: Frank Cosby, S. T. Tinsley and V. E. Tinsley.

John F. Morgan & Son, Inc., Boston, Mass., capital $10,000, to engage in heating and plumbing work. President and treasurer, John F. Morgan, Lynn, Mass.; directors, Francis H. Morgan and Sarah E. Morgan.

Graves & Marshall Co., Dayton, O., capital $20,000, to manufacture steam boilers, tanks, etc. Incorporators: William D. Graves, George L. Marshall, Henry C. Graves, George W. Marshall and Gaylord L. Marshall.

Walker & Jackson Co., Toledo, O., capital $10,000, to conduct a heating and plumbing contracting business. Incorporators: William G. Walker, George A. Jackson, John H. Sauzenbacker, N. M. Turner and C. F. Watts.

Wichita Plumbing Co., Wichita, Tex., capital $10,000, to conduct a heating and plumbing business. Incorporators: S. T. Scaling, S. R. Staniforth and W. W. Coleman.

Cully Sanitary Co., Pittsburg, Pa., capital $10,000, to manufacture plumbing specialties. Incorporators: J. S. Cully, E. A. Cully and A. D. Cully.

W. D. Newell Plumbing Co., Los Angeles, Cal., capital $50,000. Incorporators: W. D. Newell, G. W. Dryden, W. Henderson, G. W. Rosse, W. J. King, G. Johannsen and J. T. Jones.

Beeville Windmill & Plumbing Co., Beeville, Tex., capital $20,000. Incorporators: J. W. Klinstein, L. E. Potter and J. H. Hearns.

Cleveland Brass Mfg. Co., Cleveland, O., capital $150,000, to succeed the Cleveland Brass & Bronze Co., manufacturer of brass goods and specialties. The new company is building an addition to its plant at 4606 Hamilton Avenue. Incorporators: H. F. Barrett, W. H. Smith, Charles Higby, Otto Starek and A. A. Lutton.

Meadows Oil Burner & Heating Co., Los Angeles, Cal., capital $200,000. Incorporators: Adam English, Vaughan H. Meadows, Charles J. Becker and Marie S. Ertl.

Arensmeyer, Warnock, Zahrndt, Inc., Rochester, N. Y., capital $10,000, to conduct a heating and plumbing business. Incorporators: John G. Arensmeyer, Henry Warnock and Louis F. Zahrndt.

American Plumbing & Heating Co., Fall River, Mass., incorporated to take over business carried on under same name by Christopher G. Gildard and James H. Gildard.

Contracts Awarded.

George Abernathy & Sons, Columbus, O., ventilating Attorney General's office in the State House at Columbus for $2,150.

National Concrete Fireproofing Co., Cleveland, O., construction contract for completion of the Lima State Hospital, including heating, plumbing, sewage system and sewage disposal plant. The contract amounts to $360,000.

G. H. Kallis, Manitowoc, Wis., heating new Calumet County Court House for $3,965.

Zimmerman & Osborn Co., Beloit, Wis., steam heating new Ayer Hotel at Harvard, Ill., for $2,500.

Kennison Bros., Dallas, Tex., steam heating Court House at Kaufman, Tex., for $3,366; also steam heating Hotel Shelby at Terrell, Tex., for $2,098.

Lewis & Kitchen, Chicago, central heating plant for the High School building, Lincoln School and Manual Arts Building at Rock Island, Ill., for $21,521.

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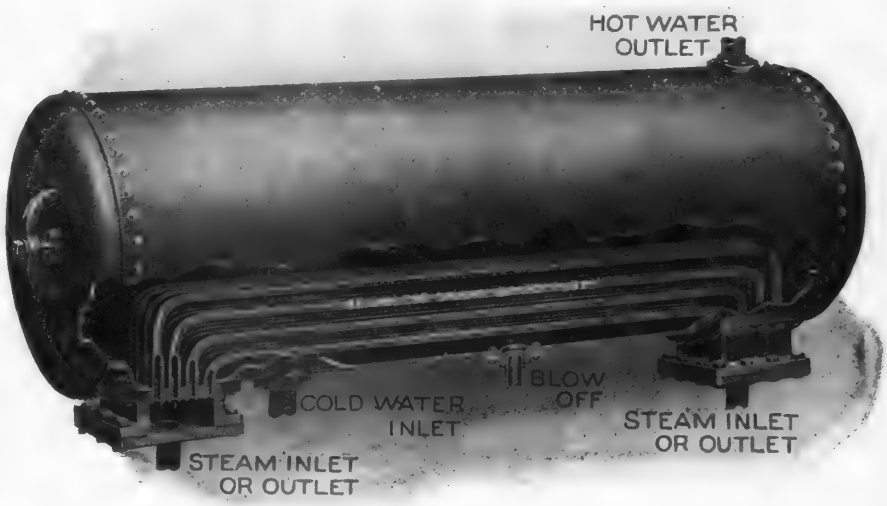
the practical improvement upon the old style tank and coil.

Boiler Plate Shells, Heavy Seamless Drawn Brass Tubes. For use with exhaust or live steam, or low pressure boilers.



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In the ordinary tank where a coil or return bend is used of the same area or size as the steam inlet pipe, its heating efficiency is rapidly destroyed, due to its being filled up by the water of condensation which forms more rapidly than it can be discharged through the single pipe.

Patterson Heaters never create back pressure. The tubes never leak. The heads never blow out.

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Knoedler & Meredith, Chattanooga, Tenn., heating and plumbing apartment building of the Inman Street Realty Co. at Cleveland, Tenn.

J. C. Reagan, Fulton, Ill., steam heating District School No. 111 for $2,200.

Moncrief Furnace & Mfg. Co., Dallas, Tex., heating and ventilating public school buildings at Palestine, Tex., for $4,100.

Evans, Almirall Co., Chicago, hot water heating for the Ohio State University at Columbus for $18,956.

Kalteux-Frank Co., Schenectady, N. Y., heating and plumbing county jail for $9,866.

Thomas Heating Co., Racine, Wis., heating new Howe and Woelz schools at Green Bay for $14,285 for the Howe School and $6,747 for the Woelz School.

Haslam Heating and Ventilating Co., Providence, R. I., heating and ventilating Roosevelt Street School at that place for $3,497.

Cox & Stone, Providence, R. I., heating and ventilating Ruggles Street School and Smith Street School at Providence.

American Warming & Ventilating Co., Toledo, O., heating new Reese Avenue School for $5,800. The mechanical equipment will include a 15 H. P. gasoline engine. Eight warm air furnaces will be installed.

J. M. Dougherty, Ottawa, Ill., heating addition to Western Clock Company's plant. The contract calls for 20,000 sq. ft. of radiation.

National Heating Co., South Bend, Ind., heating Central School Building at Laporte, Ind., for $10,000.

A. C. Schirner & Co., Hibbing, Minn., heating school building at Kinney, Minn., for $1,870.

Lake Superior Heating Co., Marquette, Minn., overhauling heating systems in the grammar and High Street schools in Ishpeming for $5,000. In the High Street school a new boiler will be installed and the radiation doubled.

Clem G. Fox, Pontiac, Ill., heating and plumbing new Y. M. C. A. Building at Bloomington for $4,487.

Lewis & Kitchen, Chicago, heating and ventilating Bingham School at South Bend, Ind.

M. Toye Estate, Winona, Minn., heating and ventilating new Kosciusko School at that place for $4,969. Other bids were: Sherman & Son, $5,450; J. V. Cunningham, $5,525.

Walters, Purk & Mellon, Philadelphia, heating Martha Washington School, at 44th and Aspen Streets, Philadelphia.

Moline Heating & Construction Co., Moline, Ill., heating and plumbing the R. C. Leedy Building at that place for $6,000.

Moline Vacuum Vapor Heating Co., Moline, Ill., heating new $250,000 building at Rock Island, Ill., for the Morris Realty Co., of Philadelphia. The Moline system of vacuum heating will be installed. The contract amounts to $12,000.

P. L. McQuillan, Chippewa Falls, Wis., installing two 275 H. P. boilers and necessary plumbing work for the new city heating plant at Chippewa Falls for $2,005. The contract for the construction of the 110-ft. brick smokestack went to H. R. Heinick, of New York, at his bid of $1,445.

Ernest H. Sturts, Philadelphia, Pa., installing new heating plant, also alterations and repairs at the Jesse George Public School for $23,000.

Sproul & McGurrin, Grand Rapids, Mich., heating St. Mary's Roman Catholic Church at Lansing.

Towe & Devendorf, Syracuse, N. Y., heating and ventilating School No. 33 for $22,300 and School No. 12 for $5,873. Other bids were: No. 33 School, R. T. Ford Co., $24,270; Barr & Creelman Co., $23,353; Frank H. Falls, $23,650; Howe & Bassett, $24,540. School No. 12, R. T. Ford Co., $5,860; Barr & Creelman Co., $6,536; Frank H. Falls, $6,690; Howe & Bassett, $7,170.

Business Chances.

WASHINGTON, D. C.—Sealed bids will be received for the following-named work:

Until August 26, 1912, for the construction complete, including plumbing, gas piping, heating apparatus, electric conduits and wiring, etc., of the U. S. Post Office at Punxsutawney, Pa.

Until August 27, 1912, for the construction, including plumbing, heating apparatus, gas piping, electric light conduits and wiring, etc., of the U. S. Post Office at Santa Barbara, Cal. Two-story building, 6,560 sq. ft, ground area.

Until August 30, 1912, for the construction, including plumbing, heating apparatus, gas piping, electric conduits and wiring, etc., of the U. S. Post Office at No. Tonawanda, N. Y.

Until Sept. 5, 1912, for the construction, including plumbing, heating apparatus, elctric conduits and wiring, etc., of the U. S. Post Office at Rapid City, S. D.

Until Sept. 6, 1912, for the extension, remodeling, etc., including plumbing, heating apparatus, etc., of the U. S. Post Office and Court House at Guthrie, Okla. Four-story and basement extension, 4,800 sq. ft. ground area.

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Wanted—Estimator and engineer for direct steam heating and fan work. State experience and salary expected. Address Estimator, care of **Heating and Ventilating Magazine.**

BOOKS ON HEATING AND VENTILATION

Steam Power Plants; Their Design and Construction. By Henry C. Meyer, Fr., M. E. Third edition, fully revised. One of the standard works on the design and construction of power plants. Covers proportioning boilers, selection and writing specifications for steam engines, selection and arrangement of auxiliaries, construction of chimneys, coal handling, etc. 219 pages. Size 6 x 9 in. Illustrated and with folding plates. Price $2.00 postpaid.

Mechanical Equipment of Federal Buildings Under Control of the Treasury Department. By Nelson S. Thompson, chief mechanical and electrical engineer, office of the supervising architect. Second edition, revised and enlarged. Contains the basic data used in the design of the mechanical and electrical equipment of Federal buildings under the control of the Treasury Department. Also contains data for approximating the cost of the various parts of the work. The book takes in heating and ventilation, plumbing, stationary and portable vacuum cleaning plants, engines and generators, motors and controlling apparatus, forced systems of hot water heating, commercial practice in factory heating, etc., and other valuable data. Cloth, $2.00.

Central Station Heating. By Byron T. Gifford. This work presents the most advanced practice in central station heating, both steam and hot water, and is an invaluable guide, not only to the engineer, but to municipalities and public service commissions where district heating is being, or will be, used. 208 pages, with 42 figures, including 50 pages of miscellaneous engineering data. Size 6 x 9½ in., bound in flexible leather. Price, $4.00.

Mechanics of Heating and Ventilating. By Konrad Meier. Including a series of ten charts containing data relating to the flow of water, steam and air, collected by Mr. Meier during an experience of 26 years in heating and ventilating work, both in this country and abroad. Each of the charts replaces a series of tables on the subject, giving at a glance the result of a calculation from any combination of factors. 161 pages, illustrated, with ten large charts. Size 6 x 9 in. Price, $5.00. Separate sets of charts, printed on cloth, with lines in different colors and mounted on boards. Single charts, $1.50. Sets of ten charts, $15.00.

Heating and Ventilating Buildings, a standard manual for heating engineers and architects. By Prof. R. C. Carpenter. Fifth edition, largely rewritten. 577 pages, 277 illustrations, 8vo, cloth, $4.00.

Handbook for Heating and Ventilating Engineers. By Prof. James D. Hoffman and Benjamin F. Raber. The latest book on this subject. Unusually comprehensive. 320 pages, with 45-page appendix. Size 4½x6¾ in., bound in flexible leather. Price, $3.50.

Questions and Answers on the Practice and Theory of Steam and Hot-Water Heating. By R. M. Starbuck. Illustrated. $1.00.

Ventilation of Buildings. By William G. Snow and Thomas Nolan. 83 pages. Pocket size. Contains a statement of the general principles of ventilation and of their application to different kinds of buildings. Boards, 50c.

Steam Heating and Ventilation. By Wm. S. Monroe. Containing formulas and data valuable in the designing of heating and ventilating plants. Price, $2.00.

Steam-Electric Power Plants. By Frank Koester. A practical treatise on the design of Central Light and Power Stations and their economical construction and operation. 473 pages. 340 ills. Price, $5.00.

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Practical Steam and Hot Water Heating. By Alfred G. King. Containing over 300 detailed illustrations. The book is a working manual for heating contractors, journeymen steam fitters, architects and builders. Describes various systems of heating and ventilation and includes useful data and tables for estimating, installing and testing such systems. 8vo. 367 pages. Price, $3.00.

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Power, Heating and Ventilation. By Charles L. Hubbard, B.S., M.E. A treatise for designing and constructing engineers and architects. The whole subject of heating is covered, including the heating of large institutions with central plants. Space is also devoted to electrical matters connected with steam plants. 647 pages. Price, $5.00 (three volumes in one).

Notes on Heating and Ventilation. By John R. Allen. 152 Pages. 34 illustrations. Size, 4½x6¾ in. One of the new books, brought quite up to date, and containing much information to guide the intelligent steam fitter in the installation and heating and ventilating apparatus. Cloth, $2.50.

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Centrifugal Fans. By J. H. Kinealy. A theoretical and practical treatise on fans for moving air in large quantities at comparatively low pressures. 206 pages. 39 diagrams. Full limp leather pocketbook round corners, gilt edges. Price, $5.00.

The Principles of Heating. By William G. Snow. A practical and comprehensive treatise on Applied Theory in Heating. 161 pages. 42 illustrations. 38 tables. Size, 6x9 in. Cloth, $2.00.

Modern Sanitary Plumbing, Steam and Hot Water. By James J. Lawler. 400 pages. 228 illustrations. Size, 6x9 in. This is the latest edition of Mr. Lawler's well-known work on this subject. Price, $5.00.

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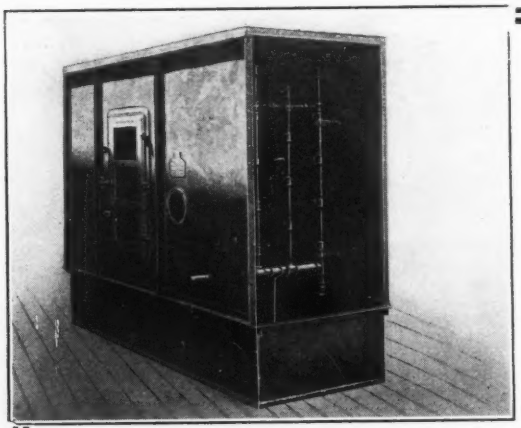

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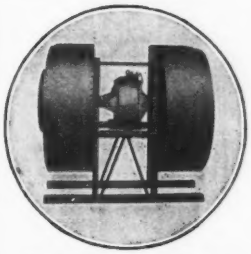

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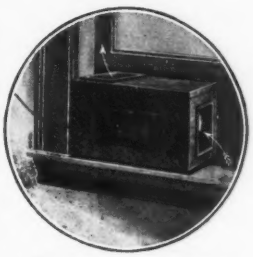

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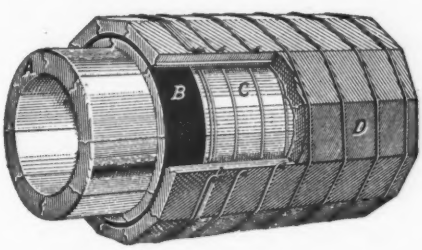

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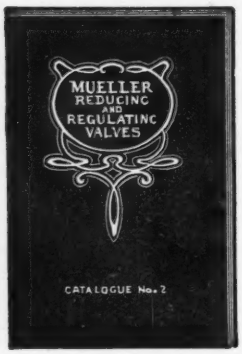

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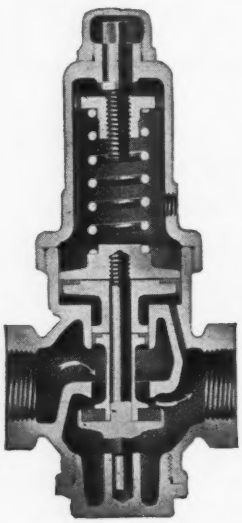

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